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ABSTRACT

The concern of this booklet is with "two-way traffic", or real communication, in distance education. Following an introduction by Holmberg, the following papers appear: "Some Thoughts on Delayed and Immediate Feedback" (Diehl); "The Effect of Field Scoring on Time to Completion in Career Development Courses" (Diehl); "Comparison of Two Pretest Feedback Modalities on End of Course Test Performance" (Diehl); "Assignments for Submission and Turn-Around Time in Distance Education" (Rekkedal); Rekkedal's comments on the three Diehl papers that appeared earlier; "Tutoring Frequency in Distance Education--An Empirical Study of the Impact of Various Frequencies of Assignment Submission" (Holmberg, Schuemer); and "Submission Density, Amount of Submission Questions, and Quality of Student-Tutor Dialogue--A Comment on Holmberg and Schuemer" (Baath). (CML)

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FernUniversität
The Distance Teaching University
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Zentrales Institut für Fernstudienforschung
The Institute for Research into Distance Education

Mediated Communication as a Component of Distance Education

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Börje Holmberg & Rudolf Schuemer
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with an introduction by
Börje Holmberg

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Introduction

Börje Holmberg, FernUniversität / ZIFF

While distance education can be - and far from seldom is - combined with face-to-face elements, its basic characteristic is non-contiguous, i.e. mediated communication. There is usually both one-way traffic in the form of pre-produced courses (printed, recorded and/or broadcast) and two-way traffic. It is with the latter that this booklet is concerned.

Traditionally real communication, i.e. two-way traffic, occurs by correspondence, i.e. in writing. Computer-mediated communication and telephone interaction are other types of communication which are gaining increasing importance. Considerable potential is to be ascribed to the possibilities that electronic mail offers for undelayed communication and that computer conferencing makes available for an asynchronous exchange of views and experiences. Nevertheless, even in the last decade of the twentieth century written communication is likely to dominate distance education. Today's preponderance of written communication is well known. A recent international study showed that 145 out of 171 distance-teaching institutions rely on 'written correspondence' (Schuemer 1988 p. 55). This written communication is largely based on assignments causing students to submit their problem solutions, answers and essays to the tutors of the supporting distance-teaching organisation for correction and comment.

This type of written communication has been made the object of some important studies with a view to clarifying its functions, methods, frequency and speed. Two already classical works stand out, John Bååth's monograph of 1980 on postal two-way communication and Torstein Rekkedal's 1973 study of the effects of reducing the turn-around times of submission assignments.

Later studies by Grover Diehl and the present author in co-operation with Rudolf Schuemer have replicated and/or looked further into the questions analysed by Bååth and Rekkedal. In this booklet these later studies are reproduced together with comments by Bååth and Rekkedal.

What the impact of frequent communication and short turn-round times is has not yet been made fully clear. While in Rekkedal's study the value of short turn-round times was shown to be statistically significant, Diehl for one (in the first of his papers published here) has come to a different conclusion (cf. also Barker et al 1986). Neither Bååth nor Holmberg & Schuemer in the studies referred to above have been able to find statistically significant support for their hypotheses about the favourable influence of frequent communication.

As shown by Bååth, Diehl and Rekkedal in this volume other circumstances than communication frequency and speed not only influence the outcome of distance study but can function as intervening variables in empirical studies of the type discussed and presented here. Diehl refers to feedback modalities, Bååth rightly points out that the character and quality of tutor-student interaction most probably influence the results and implies that high communication frequency is likely to be of importance if the interaction is of great value to students, and Rekkedal explicitly states that 'feedback interval is only one element and not necessarily the most significant one'.

The relevance of the character and quality of mediated tutoring is evidently great. The report given by Schuemer and me fails to take this into account. A separate report was planned, but has not yet been written. In our experiment the tutors aimed at personal comments on students' individual achievements, avoided merely ticking off what was correct or less correct in favour of personal notes, but at the same time used pre-produced comments on expected difficulties; experiences of the latter practice has in other contexts been favourable (Rekkedal & Ljosa 1974). In a later study pre-produced comments were developed further and used in a PC supported course model (Fritsch 1989, Klute 1989 and Küffner 1989). Whether this type of tutorial support meets Bååth's requirement that it should be 'of great value to the students' remains a problem.

When the possible value of short turn-round times of students' assignments is judged it is no doubt important on the one hand to consider the diminishing need of prompt mediated (written) feedback in the cases when supplementary face-to-face tuition is also provided, which is relevant in the Barker et al. study, on the other hand to make clear what is meant by short turn-round times (in Rekkedal's study up to a week) and delayed

feedback. It is illuminating to see what the much quoted Kulhavy has in mind; he himself says that his studies show that 'people remember correct answers just as well when feedback is delayed a day as when it is given immediately after the response' (Kulhavy 1977 p. 214).

I personally still assume that, given the right circumstances, both high communication frequency and short turn-round times can favour students' motivation and achievements, but there is no denying that there is room for hesitation and uncertainty. The well-considered comments by Bååth and Rekkedal to Diehl's and Holmberg & Schuemer's new contributions to the debate illuminate the situation.

The uncertainty in these cases is nothing unusual or unexpected. Education is concerned with human beings with personalities, hopes, and wills of their own. If we are not determinists in the sense that we totally reject the assumption that human will is in any respect free, then it is impossible to postulate any automatic cause-effect principle in research that aims at optimizing educational methods and procedures. Here theories usually have to be limited to statements to the effect that if such and such a measure is taken under specific circumstances, then this is likely to facilitate learning.

It is, as expressed by Hosford, 'impossible to determine an absolute set of instructional procedures that will be "best", for different learners, or for different learnings by one learner' (Hosford 1973 p. 114).

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- Some Thoughts on Delayed and Immediate Feedback (1982)

- The Effect of Field Scoring on Time to Completion in Career Development Courses (1989)

- Comparison of Two Pre-Test Feedback Modalities on End of Course Test Performance (1989)

Grover E. Diehl,

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Some Thoughts on Delayed and Immediate Feedback

December 1982

Grover E. Diehl,

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Popular opinion, even in the education community itself, is currently perpetuating a serious misconception concerning the question of delayed versus immediate feedback of examination results.

It is widely believed in education circles that the immediate feedback (IF) of test results is instrumental in increasing student learning. Not only, however, are the effects of IF not as generally imagined, the opposite is often true. Delaying feedback for a day or two improves retest performance in those situations paralleling most adult instructional scenarios. This phenomenon, known as the Delay-Retention Effect (DRE), is well documented in the literature (see Biehler and Snowman, 1982; Kulhavy, 1977; Surber and Anderson, 1975; and Kulhavy and Anderson, 1972; among others) but is little known outside of the testing community. This lack of widespread recognition is unfortunate since DRE can be a valuable asset in learning improvement.

Feedback versus Reinforcement

Perhaps the basic problem in the popularization of DRE is that it requires a change in what has been a standard instructional outlook. IF gained widespread currency with the proliferation of programmed instruction in the late fifties and sixties. This technique relied heavily on behavioral conditioning theory developed by B.F. Skinner at Harvard. The early successes of "programmed learning" in small-scale instructional sequences, coupled with a basic confusion of the terms feedback and reinforcement, have led to the present uncritical acceptance of IF as an unalloyed virtue of instructional technique.

Many educators continue to equate immediate feedback with behavioral conditioning's immediate reinforcement, correctly observing the both immediately follow a response made by an individual. Unfortunately they miss two important points. First, "reinforcement" is defined as some "thing" following a response which measurably alters the probability of that response recurring. Feedback has been dropped into the reinforcement category without experimental

confirmation that it performs as imagined; in fact it does not. Second, educators have mistakenly applied the behavioral conditioning model (with its emphasis on simple skill learning among rodents, birds, and small children) to the real world of complex learning tasks required of most adults. Behavioral theory is very straightforward, but works well only with small units of instruction. The long term retention problems of general education require more comprehensive solutions than the behavioral or Skinnerian model offers.

Why Delaying Feedback Works

The Delay-Retention Effect (DRE) is best explained using the "interference-perseveration theory" developed by Kulhavy and Anderson (1972). Basically, over the passage of time correct responses are remembered while incorrect responses are forgotten. The immediate interjection of feedback following examination, however, interrupts the remembering-forgetting process (called proactive interference). Thus, it is more efficient to simply refrain from interfering with the remembering of the correct responses on a test and learn anew the smaller group of previously incorrect questions at a later time.

In substance of course DRE is considerably more involved than the above explanation would suggest. The main point is that DRE delivers a different set of instructional constructs than we are accustomed to receiving from behavioral conditioning theory. Essentially, the more complex the task or question, the less the behavioral model applies and the more DRE becomes a dominant instructional mechanism.

Implementing DRE

Standardized instructions for employing DRE are not available since the requirements of each educational enterprise are highly individualized. It is really up to each school to determine which mix of immediate and delayed feedback works best for them. It should be noted that pro-DRE findings reported in the literature and upon which this essay is based are derived from resident school environments and have delays of a day or two. This may contrast with some extension education formats and may affect the generalizability of the findings. Now some specifics.

Should we return the answers to all of the questions, or just the ones the student missed? The literature discussing the value of correct versus incorrect answer feedback is a mixed bag. Research using normal educational settings (and supporting DRE) indicates that knowledge of incorrect responses is more "instructional" than knowledge of correct responses (which have no

reward or reinforcement value and are simply passed over). Other research (in support of IF) contrasts with this, finding that knowledge of correct responses is the dominant operant. The latter experiments, however, use highly specialized learning tasks not commonly considered educational. Thus, in general education it seems that feedback of incorrect responses is beneficial, while feedback of correct responses is for the most part irrelevant.

Next, feedback must be made available after the response if student learning is to be enhanced. If feedback (in the form of answers to test questions) is available either before or during the examination, students tend to cheat. For extremely simple tasks cheating is not necessarily counterproductive; in complex tasks, however, cheating should be strongly discouraged or avoided altogether by procedural barriers.

There are also two instructional components which strongly affect the contribution of feedback to the learning situation. The first is that DRE will be effective only to the degree that the student cannot short-circuit the study-examination process. Obviously cheating is a factor here. More important instructionally, though, if students are permitted to answer correctly due to cues or some other external mechanism rather than through an understanding of the material, they will tend to simply read the examination and receive little learning enhancement. The second factor: DRE will be more or less effective depending upon the degree to which students understand the material and have confidence in their answers. If students must guess and rely on chance alone for correct answers, the use of DRE as an instructional tool becomes irrelevant and, in fact, IF becomes the more powerful variable. The extreme of this condition is one of no unterstanding and the student learning that "A" is correct for item 1, "D" for item 2, and so on.

As it applies to extension education then, the literature on DRE may be summed into the following points:

1.) Ensure that students can understand the material and have confidence in their answers given appropriate preparation.

2.) For complex tasks and questions, do not allow students to short-circuit the learning-examination process, or the cheat.

3.) For very simple tasks use the immediate feedback of all responses.

4.) As tasks become more complex, delaying feedback and providing only answers to incorrect responses assumes distinct instructional advantages.

An Example of a Mixed Feedback System

In the preparation of texts and examinations the Extension Course Institute (ECI) uses a systems approach (the Instructional Systems Development (ISD) model), selecting instructional strategies appropriate to the process underway. In ISD students are led progressively, step by step, from small, discrete units of instruction (much as in behavioral conditioning) to the full understanding of complex processes and concepts.

Each volume of an ECI course is composed of a number of short learning objective segments, each with a set of test questions. The questions are numerous, come in a variety of types, and generally exhaust the content of the objective. Feedback is immediate since answers are provided in another section of the text. Upon completion of the volume the student takes a Volume Review Exercise (VRE), a multiple choice examination sampling the content of the text. Answers are not provided; but since the test is open-book students have "conditional" feedback. The VREs are scored at ECI and students informed as to which questions were missed. Correct answers are not provided, and students must research the text to learn the answers to the questions they missed. The final step is a closed-book end-of-course examination sampling all the texts in a course. Here the student is informed of pass or fail, percentage score, and which learning objective segments in the texts relate to the questions missed.

Summary

Since this discussion is necessarily brief, readers are strongly encouraged to individually peruse the literature (an excellent bibliography is found in Kulhavy (1977), discuss the subject with colleagues, and draw their own conclusions. Two points, however, should be particularly relevant to extension educators. One is that the delays coincident with the process we employ have in fact worthwhile educational advantages. The other is that "conventional wisdom" (in the present case "assuming" the effectiveness of immediate feedback) is not always correct and must be verified.

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The Effect of Field Scoring on Time To Completion in Career Development Courses

February 1989

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For many years prior to 1988 the Extension Course Institute (ECI) used intermediate formative examinations, known as Volume Review Exercises (VRE), as an integral phase of instruction. After completing each volume of a course, the student completed an open book multiple choice test by marking the answers on a machine scorable answer sheet. The answer sheet was then sent to ECI for scoring. Elapsed time from the student taking the exam to student receiving feedback from ECI was generally under two weeks. Central scoring of the examinations provided an opportunity to collect performance data on the individual volumes. There was also opinion that institutional scoring provided an affective link between the student and the organization preparing the instruction.

In the late 1980s opinion regarding the VREs shifted causing a reappraisal of the service. (Simultaneously, enormous changes were being made in the entire Career Development Course (CDC) program including a new instructional format and automated course development.) Many, but not all, of those involved in test development observed that the data provided by the VRE item analyses and summary statistics were seldom used, and argued that cutting the VREs would generate a cost saving. The idea was not new, but cast into the light of the new times it appeared more reasonable. Also, the preaddressed VRE answer sheets had been used as de facto mailing labels for sending courses to students. Operations personnel observed that eliminating both envelope stuffing and use of expensive double sided tape (instead using standard gummed labels) could expedite shipping and cost less. There was also some opinion that student/supervisor contact was perhaps more important than student/ECI contact. If the VREs were scored in the field, the supervisor would have an opportunity to interact directly with the student. Actual performance outcomes of this notion were, however, not clearly enunciated. Finally, there was a popular notion that immediate feedback, via field scoring, was superior to institutional scoring, evidence to the contrary notwithstanding (Diehl 1982).

Regardless of cause, in January 1988 ECI inaugurated field scoring. Using a phased approach, all courses contained field scorable materials by summer of the same year. The first set of fully field scorable courses, numbering 16, was activated on 4 January 1988. As part of the conversion process, the Commandant, ECI, directed that the Evaluation and Research Branch conduct a comprehensive examination of the new approach at the first opportunity and provide a report of the findings. The two basic questions to be asked were: does field scoring affect completion schedules, and does field scoring affect student performance (as measured by end-of-course test scores). The present study addresses the first question.

Method

Subjects. There were two groups of students enrolled in Career Development Courses selected for this study. The first consisted of all finishing students enrolling in CDCs in January 1985, 1986, 1987, and 1988. The second group consisted of those completing courses (pass or fail) in November of the same years. For January enrollments, only students completing their courses in under 395 days were selected; for November completions, only those with under 335 days to completion were taken. Under normal circumstances students have as long as 18 months (with extensions) to complete CDCs. A correction was necessary in this instance since the cutoff date for the 1988 sample was considerably less than the maximum available to students generally. It can be demonstrated that over 97 percent of the students, in the courses selected, normally complete their studies in 12 months or less and the sampling periods were considered acceptable compromises to ensure both comparability and timeliness of the data.

Analysis Plan. The basic research question -- has field scoring made any difference in time to completion? -- was addressed with the following specific tasks:

(1) What is the average time to completion for students who began their courses in January?
Is any difference significant?
(2) How long did students who began their courses in January take to complete each volume?
Is any difference significant?
(3) What is the average time to completion for students who completed their courses in November?
Is any difference significant?
(4) How long did students who completed their courses in November take to complete each volume?
Is any difference significant?

Descriptive data and Analysis of Covariance tables were prepared for each task. Analysis of Covariance was selected as the inferential technique since the time to completion is known to be overwhelmingly determined by the course and how many volumes it contains. Generally, short courses take less time but longer per volume than do long courses. Using course as a covariate and extracting the variance prior to examination of the main effect corrected for this and allowed the effect of field scoring to be examined in a much cleaner environment. Probabilities were reported in increments of <.25 to .10 (<.25), <.10 of .05 (<.10), <.05 to .01 (<.05) and <.01. Only statistics with probabilities less than one percent ($p<.01$) were considered significant.
Given the repetitive nature of the analysis, this had the practical result of an overall significance level of approximately five percent.

The following objective definitions were established:
1.) ENRLTIME = Total enrollment time from registration to course completion by pass or fail. This was a dependent variable.

2.) DAYSXVOL = ENRLTIME divided by the number of volumes in the course. This was a dependent variable.

3.) CDC1 to CDC15 = Effect coding of CDC number to convert the 16 CDCs under study into a set of categorical variables suitable for mathematical analysis. This became the covariate in the study.

4.) GROUPS = Effect coding to obtain a dichotomous variable consisting of FY85 to FY87 enrollments (the old institutional scoring system) and FY88 enrollments (students completing courses under field scoring). This was the main effect, or treatment, under consideration in the study.

Statistical Routines. SPSS routines FREQUENCIES, BREAKDOWN and REGRESSION as described in SPSS-X Release 2.2 (SPSS, 1986) and available on the Honeywell 6000 computer serving Maxwell and Gunter Air Force Bases were used. COMPUTE statements created effect coded variables and SELECT IF STATEMENTS segmented the full data file into the desired groupings. Analysis of Covariance corresponding to that described by Kerlinger and Pedhazur (1973) was obtained through REGRESSION using the form

```
REGRESSION VARS=DAYSXVOL ENRLTIME CDC1 TO CDC15 GROUPS/
    DEP=DAYSXVOL ENRLTIME/
    ENTER CDC1 TO CDC15/ENTER GROUPS/
    DESCRIPTIVES DEFAULTS SIG/
STATISTICS ALL
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Results and Discussion

January Enrollments

The suggestion by some observers that field scoring would reduce completion time is not supported by the present data. As shown in Table 1, the average time to completion under the old method was about 55 days, while under field scoring the time has risen to over 65 days. These data are not fully reliable since the totals are unweighted between groups, although they are weighted within groups. The mean of the course averages, however, may be considered a validity check, and these are in the same direction. Here, the FY85-87 group averaged about 71 days while the FY88 group averaged over 75. After accounting for CDC taken, see Table 2, the true impact of field scoring is shown to be very small (less than 1/10 of 1%) and not significant ($p<.25$). The R2 for CDCs is .659, indicating that almost two thirds of the total variance of time to complete each volume is accounted for by the course alone, a finding within the desired significance region.

The same conclusion holds for total time to completion. As shown in Table 3, after accounting for CDC taken, the change to field scoring was associated with a very small difference in completion time (about 1/10 of 1%) and was not significant ($p<.10$). The R2 of the covariate, however, dropped considerably (almost in half) suggesting that taking time per volume (as in Table 2) corrected for the fact that shorter courses tend to take longer per volume.

Table 1: Mean Days to Completion* of Each Volume within CDCs for January Enrollments

CDC	FY88-87/N Students	FY88/N Students	Nr Vols
11350B	42.9167/12	-	5
27132	53.5904/94	55.6071/21	4
30451	41.6878/41	42.2222/9	5
30750	41.5755/71	62.3438/24	4
32658C	112.5789/19	103.8375/40	2
32853	47.6839/143	53.8500/28	5
42350	58.4970/167	61.2560/56	3
42652	42.3616/325	43.3520/107	6
42753	57.4505/37	58.6111/12	3
		Note: as of 6 Jun 88: 4 vols	
43152C	63.3139/154	55.3718/52	3
46450	45.5000/30	51.4444/3	6
49152	54.6923/26	63.1389/36	3
55131	-	-	3
61251	119.2821/39	125.0000/3	1
67273B	223.7000/10	222.1875/16	1
74131	58.7586/58	56.7500/16	3
Entire Population	55.1940/1226	65.3009/423	
Average of Means	70.9059	75.3552	

* (Total days to completion/number of volumes)/N

Table 2: Summary of Analysis of Covariance Examining the Effect of Scoring Treatment on Average Time to Completion for Volumes within Courses among January Enrollments: N = 1649

Source	R2	SS	df	MS	F	p<
Covariate	.659	1159551	14*	82825	225.068	.01
Treatments	.000	750	1	750	2.038	.25
Error	.341	600286	1633	368		
Total	1.0	1760587	1648			

* one CDC, 55131, had no enrollments during the period

Table 3: Summary of Analysis of Covariance Examining the Effect of Scoring Treatment on Total Time to Completion among January Enrollments: N = 1649

Source	R2	SS	df	MS	F	p<
Covariate	.337	2163202	14*	154514	59.428	.01
Treatments	.001	7118	1	7118	2.736	.10
Error	.662	4246918	1633	2600		
Total	1.0	6417238	1648			

* one CDC, 55131, had no enrollments during the period

November Completions

Examining data for November completions is a validity check on the January sample. Instead of looking forward to how long it took students to complete, the focus is on when students enrolled given a fixed completion point. Although there is some overlap between the January and November samples, it is only 105 students out of 2895. These are under four percent and, from examination of frequency data, are spread more or less randomly among the CDCs. Sampling bias is not apparent.

As with the January data, there is an apparent shift among the field scored students towards longer enrollment times. From Figure 1, it appears that students completing in November 1988 tended to enroll earlier in the year than did comparable students in November 1985, 86 and 87, and the distribution within the enrollment period is flatter. An interesting anomaly in the figure occurs at the NOV entry along the baseline. Although it is difficult to see, the raw data show .3 percent of the November 1988 completions actually enrolled the same month. For years 1985 through 1987 there were no November cancellations who enrolled the same month. Although this seems incongruous with the overall observation that field scoring students take longer, it actually provides additional support.

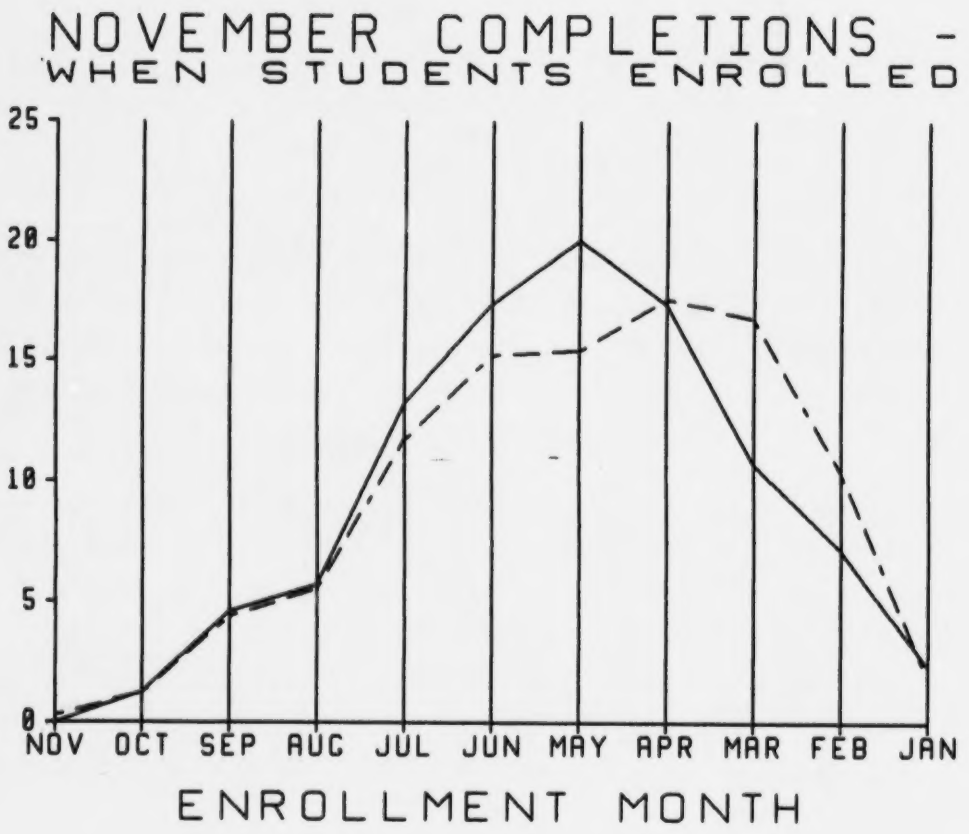

Figure 1. Enrollment months for students completing Career Development Courses in the month of November in years 1985 through 1988.

Prior to 1988 end-of-course examinations were triggered by return of the last VRE answer sheet, which required a turnaround time of about two weeks to get an exam back to the student for administration. Given the outset mail transit time of the course packages (normally 2 to 3 weeks (Diehl 1988 and 1984)), it was administratively impossible for a student to complete a course -- registration to completion of the exam -- in under 30 days. Under field scoring, end-of-course examinations are forwarded via an automated system at the request of the student, eliminating the previous two week turnaround. Thus, it became theoretically possible to complete quickly and .3 percent of the students actually took advantage of the opportunity. Unfortunately, the opportunity did not translate into an across-the-board two-week reduction in completion time.

Examining the data in Table 4 suggests that students completing in November 1988 actually began their courses earlier than in previous years, thus taking relatively longer to complete. Grouped, the average length of time for each volume in the courses was 58 and 65 days for FY1985-78 and FY88, respectively. The means of the averages were 68 and 76, respectively. Again, however, these apparent differences are not statistically significant. The Analysis of Covariance for total days to completion, the statistical test for the data shown in Figure 1, are at Table 5. After accounting for CDC taken, the proportion of time to completion variance accounted for by the type of VRE scoring was about .2 percent. The probability of this statistic was .05, which was not significant under the parameters of the present study. Even if it had been significant, the extremely low R2 (.002) is of little more than academic interest. It is difficult to imagine what type of management decision would be made on a finding this small. Also in Table 5, note that the R2 of the covariate is at about the same level as that in Table 4, the equivalent analysis for the January enrollments.

Table 4: Mean Days to Completion* of Each Volume within CDCs for November Completions

CDC	FY88-87/N Students	FY88/N Students	Nr Vols
113508	52.2571/7	-	5
27132	57.0372/47	52.2283/23	4
30451	44.2880/25	44.8500/12	5
30750	38.9818/55	57.7750/10	4
32658C	100.0781/32	112.5484/31	2
32853	47.9947/114	48.4929/28	5
42350	57.6588/115	62.7333/45	3
42652	42.1758/281	40.9297/83	6
42753	59.1880/39	51.0606/11	3
		Note: as of 6 Jun 88 4 vols	
43152C	62.8652/136	56.2473/31	3
46450	41.1667/8	42.6333/5	6
49152	52.5532/47	65.5789/19	3
55131	-	-	3
61251	125.9231/52	169.7500/8	1
67273B	186.2353/17	177.7857/14	1
74131	59.0612/49	82.8333/4	3
Entire Population	58.3171/1024	65.6115/320	
Average of Means	68.4976	76.1033	

* Σ (Total days to completion/number of volumes)/N

Table 5: Summary of Analysis of Covariance Examining the Effect of Scoring Treatment on Total Time to Completion among November Completions: N = 1348

Source	R2	SS	df	MS	F	p<
Covariate	.350	1563349	14*	111667	51.294	.01
Treatments	.002	8678	1	8678	3.986	.05
Error	.648	2899690	1332	2177		
Total	1.0	4471716	1347			

* one CDC, 55131, had no enrollments during the period

Table 6: Summary of Analysis of Covariance Examining the Effect of Scoring Treatment on Average Time to Completion for Volumes within Courses among November Completions: N = 1348

Source	R2	SS	df	MS	F	p<
Covariate	.632	1085983	14*	77570	164.343	.01
Treatments	.001	1810	1	1810	3.835	.10
Error	.366	629196	1332	472		
Total	1.0	1716989	1347			

* one CDC, 55131, had no enrollments during the period

Finally, the information available on time to completion for each volume for the November completions is similar to that for the January enrollments. In Table 6, the effect due to treatments (type of VRE scoring) remains small and not significant, while the covariate (CDC taken) accounts for a significant proportion of the variability in enrollment time (over 63%, $p<.01$). These data are extremely close to those in Table 2.

Conclusion

It is clear that the implementation of field scoring has opened a window for accelerated course completion, of which students have overwhelmingly failed to take advantage. On the basis of both total time to completion and time to completion for individual volumes, field scoring has made no impact that is either statistically or practically significant. Time to completion is predominently a function of the course in which the student is enrolled.

There was in this study no attempt to either prove or disprove any of the a priori notions initially provided in support of the change from institutional to field scoring of the volume review exercises. Indeed, to do so would have been completely presumptive as there is no single justification for the change, and the arguments differ depending upon the ECI division being interviewed. For this reason, the discussion was intentionally non-directional and the reader is encouraged to evaluate the data independently.

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Comparison of Two Pre-test Feedback Modalities on End of Course Test Performance

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The effect of quick feedback on student performance is open to considerable conjecture in the general educational community and it depends greatly on the content and method of instruction. The immediate feedback proponents generally advance a simplistic behavioral conditioning argument and it works well for simple task acquisition. Kulhavy and Anderson (1972) were among the first to seriously question whether there might be a positive "interference-perseveration" effect especially in the more complex cognitive tasks. Basically, they noted that people tend to forget what they do not know well and that these are the items generally missed on examinations. If there is a delay in providing feedback, students remember relatively more of the correct information; immediate feedback, however, introduces proactive interference which interrupts the forgetting process.

The present study examines the impact of delayed versus immediate feedback (or turn-around time) from a slightly different perspective. Prior to taking the final examination each Extension Course Institute (ECI) student completes intermediate formative experiences, called volume review exercises (VRE). In appearance these are exactly like the final examinations but the VREs are open book while the final exams are proctored, closed book summative instruments. Prior to January 1988, students recorded their answers to the VREs on separate answer sheets which were mailed to ECI for scoring. Results and instructional guidance were mailed back. The turn-around time for the procedure was about two weeks. For a number of reasons, including a desire to reduce the turn-around time and perhaps positively influence student performance, ECI instituted field scoring in January 1988. Via this mechanism there was an opportunity to make student performance feedback immediate. Under both procedures students have immediate "conditional" information on their performance (the open book aspect). The difference between the two groups is in the timeliness of formal assurance.

Method

Subjects. There were two groups of students enrolled in Career Development Courses selected for this study. The first consisted of all finishing students who enrolled in CDCs in January 1985, 1986, 1987, and 1988. The second group consisted of those completing courses (pass or fail) in November of the same years. For January enrollments, only students completing their courses in under 395 days were selected; for November completions, only those with under 335 days to completion were taken. Under normal circumstances students have as long as 18 months (with extensions) to complete CDCs. A correction was

necessary in this instance since the cutoff date for the 1988 sample was considerably less than the maximum available to students generally. It can be demonstrated that over 97 percent of the students in the courses selected normally complete their studies in 12 months or less and the sampling periods were considered acceptable compromises to ensure both comparability and timeliness of the data.

Analysis Plan. The basic research question -- has field scoring of the VREs made any difference in student end of course test performance? -- was addressed with the following specific tasks:

1. Under each feedback condition, what is the average score for students who began their courses in January? Is any difference significant?
2. Under each feedback condition, what is the average score for students who completed their courses in November? Is any difference significant?

Descriptive data and Analysis of Covariance tables were prepared for each task. Analysis of Covariance was selected as the inferential technique since test score is overwhelmingly dependent upon the course and individual test form. Using test form as a covariate and extracting the variance prior to examination of the main effect corrected for this and allowed the effect of field scoring to be examined in a much cleaner environment. Probabilities were reported in increments of <.25 to .10 (<.25), <.10 of .05 (<.10), <.05 to .01 (<.05) and <.01. Only statistics with probabilities less than five percent ($p<.05$) were considered significant.

The following objective definitions were established:

1.) TESTSCOR = Student score on the final examination and the dependent variable in the study. Students failing an initial end of course examination are offered a retest. Those not taking the retest are considered non-completions; those failing the retest are course failures; those passing are successful completions. Only the last two categories are included in the present study.

A note on the psychometric characteristics of the tests. All are four option multiple choice examinations with a maximum of 124 items randomly selected from hundreds, often thousands, available for each course. Although the number of items tends to decrease over time (bad items are deleted, no new items are added and there are no substantive corrections), unpublished homogeneity of variance tests performed on samples of 51, 126 and 201 students in 1981 demonstrated that the initial randomization procedure produces remarkable stability.

2.) T11321 to T74129 = A set of 56 effect coded vectors to account for the 57 separate end of course examinations encountered in the study. The actual number of tests applicable to January enrollments and November completions is less due to selection fluctuations. This was the covariate in the study.

3.) GROUPS = Effect coding to obtain a dichotomous variable consisting of CY85 to CY87 enrollments (the old institutional scoring system) and CY88 enrollments (students completing courses under field scoring). This was the main effect, or treatment, under consideration in the study.

Statistical Routines. SPSS routines FREQUENCIES, BREAKDOWN and REGRESSION as described in SPSS-X Release 2.2 (SPSS, 1986) and available on the Honeywell 6000 computer serving Maxwell and Gunter Air Force Bases were used. COMPUTE statements created effect coded variables and SELECT IF STATEMENTS segmented the full data file into the desired groupings. Analysis of Covariance corresponding to that described by Kerlinger and Pedhazur (1973) was obtained through REGRESSION using the form

```
REGRESSION VARS=TESTSCOR T11321 TO T74129 GROUPS/
   DEP=TESTSCOR/
   ENTER T11321 TO T74129/ENTER GROUPS/
   DESCRIPTIVES DEFAULTS SIG/
STATISTICS ALL
```

Results and Discussion

January Enrollments

Despite the large number of examinations and diversity of subject matter in the courses selected for this study, the mean scores and standard deviations are remarkably close. As shown in Table 1, the overall average mean score was 81.5, with a standard deviation of 3.7. The field scored courses were slightly higher than the institutionally scored courses, 82.8 versus 81.1, respectively, although the field scored courses had relatively more variability (SD for CY85-87 was 3.8 and for CY88 it was 4.4). For the entire 1649 students in the sample taken together, the grand mean was 81.31 and standard deviation was 9.029.

The data in Table 1 strongly suggest that there is more variability among tests than between the two VRE scoring methods. This impression is substantiated in the Analysis of Covariance. As shown in Table 2, the covariate -- test form -- accounted for over 11 percent of the variability in student performance. After removing this variance, the effect due to treatment -- the VRE scoring procedure -- added virtually no new variance to the model (less than .0005 percent). The F for the covariate had a probability of less than .01. The F for treatment, however, did not even require calculation as the mean square due to treatment was less than the mean square in the error term. In the January enrollments, then, the implementation of VRE field scoring made no significant difference in student performance.

Table 1: Descriptive Statistics for End of Course Examinations among January Enrollments during 1985 through 1988: N = 1649

		Enrollment Year								
	Test	1985-87			1988			Total 1985-88		
CDC	Form	Mean	SD	N	Mean	SD	N	Mean	SD	N
11350	21	80.1	7.0	7	-	-	-	80.1	7.0	7
	22	79.5	12.0	2	-	-	-	79.5	12.0	2
	23	84.0	0.0	1	-	-	-	84.0	0.0	1
	24	77.5	2.1	2	-	-	-	77.5	2.1	2
	Total:	Mean = 79.9, SD = 6.6, N = 12								
27132	33	77.4	11.8	42	-	-	-	77.4	11.8	42
	34	76.1	10.0	38	-	-	-	76.1	10.0	38
	35	72.3	13.5	6	75.3	8.4	10	74.2	10.3	16
	36	73.9	16.3	8	74.5	9.7	11	74.3	12.5	19
	Total:	Mean = 76.0, SD = 11.1, N = 115								
30451	33	85.0	7.5	21	80.3	9.0	3	84.5	7.7	24
	34	85.8	6.1	20	84.3	3.3	6	85.4	5.5	26
	Total:	Mean = 85.0, SD = 6.6, N = 50								
30750	25	78.3	11.8	33	-	-	-	78.3	11.8	33
	26	85.5	8.9	38	-	-	-	85.5	8.9	38
	29	-	-	-	89.7	5.9	14	89.7	5.9	14
	30	-	-	-	87.1	6.2	10	87.1	6.2	10
	Total:	Mean = 83.8, SD = 10.2, N = 95								
32568C	23	85.3	9.8	9	86.8	8.0	23	86.4	8.4	32
	24	82.3	7.6	10	85.5	5.2	17	84.3	6.3	27
	Total:	Mean = 85.4, SD = 7.5, N = 59								
32853	23	79.2	10.4	28	-	-	-	79.2	10.4	28
	24	81.9	10.2	17	-	-	-	81.9	10.2	17
	25	80.4	8.9	40	78.2	8.3	14	79.9	8.7	54
	26	82.6	9.4	58	82.5	9.2	14	82.6	9.3	72
	Total:	Mean = 81.1, SD = 9.4, N = 171								

(Continued)

Table 1 (continued)

Descriptive Statistics for End of Course Examinations among January Enrollments during 1985 through 1988: N = 1649

Test		Enrollment Year 1985-87			1988			Total 1985-88		
CDC	Form	Mean	SD	N	Mean	SD	N	Mean	SD	N
42350	23	84.7	8.1	90	-	-	-	84.7	8.1	90
	24	84.1	8.9	77	-	-	-	84.1	8.9	77
	25	-	-	-	79.8	5.7	29	79.8	5.7	29
	26	-	-	-	80.6	5.6	27	80.6	5.6	27
	Total:	Mean = 83.3, SD = 8.0, N = 223								
42652	23	78.8	4.5	4	-	-	-	78.8	4.5	4
	25	78.5	7.4	50	-	-	-	78.5	7.4	50
	26	77.7	8.4	46	-	-	-	77.7	8.4	46
	27	80.5	8.1	97	-	-	-	80.5	8.1	97
	28	80.4	7.9	128	-	-	-	80.4	7.9	128
	29	-	-	-	78.2	10.7	52	78.2	10.7	52
	30	-	-	-	79.4	8.7	55	79.4	8.7	55
	Total:	Mean = 79.5, SD = 8.4, N = 432								
42753	21	76.0	8.1	22	80.7	4.7	6	77.0	7.7	28
	22	78.0	5.9	15	79.7	11.3	6	78.5	7.6	21
	Total:	Mean = 77.6, SD = 7.6, N = 49								
43152	21	82.6	8.4	81	80.6	8.4	22	82.2	8.4	103
	22	81.4	8.5	73	84.3	6.2	30	82.3	8.0	103
	Total:	Mean = 82.2, SD = 8.2, N = 206								
46450	32	84.2	4.8	5	-	-	-	84.2	4.8	5
	33	88.5	9.2	2	-	-	-	88.5	9.2	2
	34	84.6	8.6	14	94.0	0.0	2	85.8	8.6	16
	35	79.9	11.0	9	88.0	0.0	1	80.7	10.7	10
	Total:	Mean = 84.2, SD = 8.9, N = 33								
49152	01	83.3	8.1	14	82.8	8.0	26	83.0	8.0	40
	02	78.5	7.4	12	78.9	5.2	10	78.7	6.4	22
	Total:	Mean = 81.5, SD = 7.7, N = 62								

(Continued)

Table 1 (continued)

Descriptive Statistics for End of Course Examinations among January Enrollments during 1985 through 1988: N = 1649

Test		Enrollment Year 1985-87			1988			Total 1985-88		
CDC	Form	Mean	SD	N	Mean	SD	N	Mean	SD	N
61251	01	78.3	7.7	6	-	-	-	78.3	7.7	6
	02	84.7	4.5	3	-	-	-	84.7	4.5	3
	03	78.0	9.0	12	84.5	9.2	2	78.9	9.0	14
	04	85.6	7.6	18	84.0	0.0	1	85.4	7.4	19
	Total:	Mean = 82.2, SD = 8.3, N = 42								
67273	01	91.4	5.3	8	85.9	11.1	9	88.4	9.0	17
	02	81.0	19.8	2	86.4	16.1	7	85.2	15.8	9
	Total:	Mean = 87.3, SD = 11.6, N = 26								
74131	27	79.8	9.1	11	-	-	-	79.8	9.1	11
	28	77.2	9.6	12	-	-	-	77.2	9.6	12
	29	84.3	9.0	21	80.0	7.0	7	83.2	8.6	28
	30	80.6	9.3	14	86.4	6.8	9	82.9	8.7	23
	Total:	Mean = 81.6, SD = 9.0, N = 74								
Average of Test Form Means		81.1	3.8	45	82.8	4.4	28	81.5	3.7	51
Weighted Grand Mean = 81.31, SD = 9.029, N = 1649										

Table 2: Summary of Analysis of Covariance Examining the Effect of Scoring Treatment on End of Course Test Performance among January Enrollments: N = 1649

Source	R2	SS	df	MS	F	p<
Covariate	.111	14964	51	293	3.907	<.01
Treatments	.000	53	1	53	<1.0	>.25
Error	.888	119338	1596	75		
Total	1.0*	134355	1648			

* Difference due to rounding from 5 decimal places

The value of this finding is somewhat ambiguous. If the point of interest is improving student performance, reducing turn-around time does not seem to be of much value. This finding is consistent with Holmberg and

The demands on total quality is increasing. Student satisfaction is a result of acceptable relations between expectations and experiences. It seems clear to me that the demands on educational institutions for higher quality and better service are increasing. In the light of these developments turn-around time is, according to students' viewpoints, one important element in the total quality concept.

There is also reason to believe that as electronic communication becomes more usual, students' expectations will change, and they will demand quicker feedback. While the students in the seventies were satisfied with one-week return time for their assignments, we may well expect that this will not be acceptable in the 90'ies. Or while correspondence-course students accept one week, we have already experienced that students taking part in distance-education computer-based communication systems do not accept to wait for two days to have their questions answered.

For some time distance-education systems that base their communication on different media and methods will exist side by side, and they will be compared. In this situation it is my prediction that attention to turn-around time will be even more important than before.

Schuemer and some of the research cited by Baker et al. On the other hand, if monetary costs are the principal interest, the change did not adversely affect student performance and no change is, in fact, a desirable outcome. The import of the findings are, then, dependent on the point of view of the reader. There may also be public relations aspects of quick turn around which would be of interest to some distance education providers.

November Cancellations

The results and conclusions of the January enrollments are replicated and confirmed by the November cancellations. The groups are considered independent, although there was a slight overlap (under 5%) between the two.

Comparing Table 3 with Table 2, the mean averages are all within one percent. The standard deviations are also close, and the relatively wider variability of the CY88 group over the CY85-87 was maintained. The Analysis of Covariance of the November cancellation data (Table 4) is also nearly identical with that shown in Table 2. In fact, the difference in the R squared of the error term is only .008. Test form continued to account for over 10 percent of the variability of test scores, while the effect due to VRE field scoring was not significant ($p > .25$).

Table 3: Descriptive Statistics for End of Course Examinations among November Completions during 1985 through 1988: N = 1348

Test		Enrollment Year 1985-87			1988			Total 1985-88		
CDC	Form	Mean	SD	N	Mean	SD	N	Mean	SD	N
11350	21	83.3	5.5	3	-	-	-	83.3	5.5	3
	22	81.0	14.1	2	-	-	-	81.0	14.1	2
	24	76.0	4.2	2	-	-	-	76.0	4.2	2
	Total:	Mean = 80.6, SD = 7.6, N = 7								
27132	33	78.4	13.6	20	-	-	-	78.4	13.6	20
	34	80.0	6.7	20	-	-	-	80.0	6.7	20
	35	73.3	11.7	3	82.7	7.9	11	80.7	9.2	14
	36	70.0	20.2	4	79.7	8.3	12	77.2	12.3	16
	Total:	Mean = 79.1, SD = 10.7, N = 70								
30451	33	83.1	7.7	12	88.3	5.8	6	84.8	7.4	18
	34	86.1	4.0	13	79.8	9.8	6	84.1	6.8	19
	Total:	Mean = 84.5, SD = 7.0, N = 37								
30750	25	79.9	10.7	28	-	-	-	79.9	10.7	28
	26	85.3	11.4	27	-	-	-	85.3	11.4	27
	29	-	-	-	90.1	6.6	7	90.1	6.6	7
	30	-	-	-	92.3	1.2	3	92.3	1.2	3
	Total:	Mean = 83.8, SD = 11.0, N = 65								
32658C	23	85.3	8.6	11	85.3	10.5	14	85.3	9.5	25
	24	84.7	7.5	21	80.1	9.9	17	82.6	8.8	38
	Total:	Mean = 83.7, SD = 9.1, N = 63								
32853	23	78.9	8.6	21	-	-	-	78.9	8.6	21
	24	79.0	8.1	11	-	-	-	79.0	8.1	11
	25	79.7	10.1	49	81.5	10.2	15	80.2	10.0	64
	26	83.0	8.8	33	83.6	8.5	13	83.2	8.6	46
	Total:	Mean = 80.9, SD = 9.3, N = 142								

(Continued)

Table 3 (Continued)

Descriptive Statistics for End of Course Examinations among November Completions during 1985 through 1988: N = 1348

Test		Enrollment Year 1985-87			1988			Total 1985-88		
CDC	Form	Mean	SD	N	Mean	SD	N	Mean	SD	N
42350	23	87.6	8.0	54	-	-	-	87.6	8.0	54
	24	85.3	8.7	61	-	-	-	85.3	8.7	61
	25	-	-	-	77.6	4.2	24	77.6	4.2	24
	26	-	-	-	79.7	6.9	21	79.7	6.9	21
	Total:	Mean = 84.2, SD = 8.5, N = 160								
42652	25	79.3	7.5	63	-	-	-	79.3	7.5	63
	26	79.5	7.7	44	-	-	-	79.5	7.4	44
	27	79.8	9.0	76	-	-	-	79.8	9.0	76
	28	79.4	7.4	78	-	-	-	79.4	7.4	78
	29	80.8	5.6	9	78.5	9.9	42	78.9	9.2	51
	30	83.6	5.1	11	80.7	6.4	41	81.3	6.2	52
	Total:	Mean = 79.7, SD = 7.9, N = 364								
42753	01	-	-	-	73.3	15.0	3	73.3	15.0	3
	02	-	-	-	80.7	6.7	3	80.7	6.7	3
	21	78.3	7.4	26	71.5	10.6	2	77.8	7.6	28
	22	79.5	7.8	13	75.7	1.5	3	78.8	7.2	16
	Total:	Mean = 78.0, SD = 7.8, N = 50								
43152	21	81.4	7.8	74	85.1	6.7	15	82.0	7.7	89
	22	80.1	9.3	62	85.4	6.2	16	81.2	9.0	78
	Total:	Mean = 81.6, SD = 8.3, N = 167								
46450	34	78.5	13.0	4	89.0	0.0	2	82.0	11.4	6
	35	79.5	11.8	4	78.0	8.5	2	79.0	9.9	6
	37	-	-	-	72.0	0.0	1	72.0	0.0	1
	Total:	Mean = 79.8, SD = 10.2, N = 13								
49152	01	82.8	8.4	24	81.6	7.4	14	82.3	8.0	38
	02	78.6	6.8	23	74.8	9.5	5	77.9	7.3	28
	Total:	Mean = 80.4, SD = 7.9, N = 66								

(Continued)

Table 3 (Continued)

Descriptive Statistics for End of Course Examinations among November Completions during 1985 through 1988: N = 1348

Test		Enrollment Year 1985-87			1988			Total 1985-88		
CDC	Form	Mean	SD	N	Mean	SD	N	Mean	SD	N
61251	02	78.0	0.0	1	-	-	-	78.0	0.0	1
	03	78.1	7.5	27	76.0	11.3	7	77.6	8.2	34
	04	76.9	9.9	24	82.0	0.0	1	77.1	9.8	25
	Total:	Mean = 77.4, SD = 8.8, N = 60								
67273	01	83.1	6.1	9	91.2	5.3	8	86.9	7.0	17
	02	95.1	6.5	8	90.0	12.8	6	92.9	9.6	14
	Total:	Mean = 89.6, SD = 8.7, N = 31								
74131	27	76.8	9.4	11	-	-	-	76.8	9.4	11
	28	76.6	10.1	7	-	-	-	76.6	10.1	7
	29	80.6	11.5	14	78.3	5.0	3	80.2	10.6	17
	30	82.7	9.0	17	100.0	0.0	1	83.7	9.6	18
	Total:	Mean = 80.2, SD = 10.1, N = 53								
Average of Test Form Means		80.7	4.1	42	82.1	6.5	31	81.0	4.2	49
Weighted Grand Mean = 81.202, SD = 8.977, N = 1348										

Table 4: Summary of Analysis of Covariance Examining the Effect of Scoring Treatment on End of Course Test Performance among November Completions: N = 1348

Source	R2	SS	df	MS	F	p<
Covariate	.118	12859	48	268	3.622	<.01
Treatments	.001	57	1	57	<1.0	>.25
Error	.881	95629	1298	74		
Total	1.0	108545	1347			

Conclusion

The elimination of institutional scoring of formative volume review exercises and the implementation of VRE field scoring has made no significant difference in student performance as measured by summative end of course examinations.

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Assignments for submission and turn-around time in distance education.

A comment on Diehl, G. E.:

- Some Thoughts on Delayed and Immediate Feedback (1982)
- The Effect of Field Scoring on Time to Completion in Career Development Courses (1989)
- Comparison of Two Pre-Test Feedback Modalities on End of CourseTest Performance (1989)

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Assignments for submission and turn-around time in distance education. A comment on Diehl

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Introduction

When I started my research in distance education in the beginning of the seventies, it was only natural that two-way communication by written letters became one of the focal points.

Real two-way communication between the student and the tutor at a distance is considered to be one of the necessary requirements for having a teaching activity within the definition of distance education (see for example Rumble 1989, Keegan 1988). When looking back on the experiment carried out in 1972 73, I find that I argued for the importance of examining turn-around time:

> "For a long time yet we will have to depend on the mail, though in the future we can expect to be able to use other types of communication in distance education" (Rekkedal 1973, 1983).

I was, of course, thinking of different uses of telephone communication, probably not at all foreseeing the rapid developments we experience today in applying computer mediated communication in distance education, developments in which I find myself dayly occupied.

Even today, I would be highly surprised if two-way communication by mail and questions about turn-around time as an important quality aspect of distance education should loose importance during the next few years.

Some early writings on reasons for dropping out of distance education courses pointed at problems concerning number and frequency of assignments and turn-around time. In a survey carried out by Sloan (1965) one of the reasons for dropping out is that the time element involved in communication with teachers lead to a drop in interest. Students had to wait long before their questions were answered by the teachers. In Sloan'ssurvey we also find that the students mention "reduce the number and extent of lessons" as a suggestion for increasing completion rates. These viewpoints indicate the relationships between variables such as submission density, number of questions (or workload) per assignments, self-check exercises and turn-around time. In another study by Harter (1969) the slow return of corrected assignments and administrative procedures were given as the most frequent reasons for dropping out. Students in this study stated that they had waited from two to four months (!) for their corrected homework assignments.

The functions of the assignments for submission

In my view, turn-around time is of importance to the students only as far as the assignments for submission have functions which the students perceive as important, and to the degree that time influences the quality of how these functions are taken care of. According to Grahm (1969) the assignments have two main functions:

1. Learning efficiency can be increased by demanding activity by the student and giving him/her guidance and structure in the study of course materials.

2. Assignments enable the tutor to evaluate and follow the student's progress while the student is informed about his/her progress.

In a study by Bååth (1976), several European correspondence schools (and the British Open University) ranked different functions of assignments for submission. The study clearly showed that according to the distance teaching educators the assignments for submission have functions of special relevance to tutors / institute / administration on the one hand and to the students on the other hand. If we look at functions the assignments for the students have, the following aspects are of special importance (according to ranking in the study):

a. To give the student effective feedback, help to correct mistakes and control their progress.
b. To motivate the student - by serving as sub-goals.
c. To activate the student.
d. To give the student opportunities for application and transfer of knowledge.
e. To counteract the student's feelings of isolation.
g. To give the student help in survey, sum up and integrate various parts of a course unit.
h. To focus the student's attention on important learning objectives.
i. To serve as a means for the student to revise the unit.
k. To teach in such a way that knowledge is retained, through practice in writing.
l. Sent according to schedule, to compel the students to regular work.

One can argue that probably some functions in this list are more dependent on turn-around time than others. If so, turn around-time may be shown to be of different importance in relation to which functions are actually perceived by the students to be of importance in their specific distance learning situation.

Research, experiments and generalisations

Why do different researchers arrive at different conclusions? Can results from well designed and controlled research be generalised? What can we learn from practice? What can we learn from research?

During the last few years distance educators have searched for theories of distance education and for experimental research based on theories and designed so that results may be generalised (see for example Moore 1985). I agree that we need theory building and experimental research to test theories. At the same time I am of the opinion that well founded research based on inductive methods aimed at finding solutions to practical problems also contributes to developing knowledge, theory and better practice. Few facts in education can be universally generalised. This means that one might expect that research findings from well controlled and designed experiments should be put to the test in similar experiments with similar students under the same treatment. Normally, however, teaching/learning situations differ - in many ways. Thus, one should not be surprised that different researchers reach different results. Nevertheless, I firmly believe that such research brings us forward in theory and practice, also when the results seem to be inconsistent.

Research on turn-around time

In our preliminary research project at NKI from 1973 we came to the following conclusions:

1. There is a significant relationship between turn-around time and rates of completions.

2. There is a significant relationship between turn-around time and number of assignments completed during the first three months of study.

3. There is a significant relationship between turn-around time and the students' satisfaction with the time it takes to get the assignments back from the tutor.

4. We found no significant relationship between turn-around time and the time it took to complete the course.

5. We found no significant relationship between turn-around time and student performance measured by the final grades in the course.

Since then relationsships between turn-around time and student performance and student attitudes have been examined in many settings. In the ICDE sponsored international research project Barker et al. (1986) examined the relationship between some measures on student-institution contacts and persistence. They found no clear or consistent relationsships between turn-around time and persistence. The research showed statistically significant relationsship between these variables at only one of the five institutions surveyed. This international research study also showed that there are great differences between the institutions and courses

concerning course length, average turn-around time,number of assignments, feedback intervals (in this study time between feedback opportunities) and completion rates. The average turn-around time at the institutions varied from 8 to 25 days. These figures may be discussed in relation to our findings and the findings of others (Bååth & Månsson 1977), where the conclusions seem to be that the students seem to tolerate a turn-around time of about a week or less without negative effects, but not much more. Again, there is reason to believe that the limit would vary with courses, level of study, student groups, and even between countries.

The British Open University has also collected some statistics and information on student opinions in connection with a try out of a new routing procedure for "Tutor Marked Assignments" (Field 1987).

The try out followed experimental procedures with a control group and an experimental group of tutors and students following the old and new route procedures. According to the old route procedures the tutors sent the graded and commented assignments through the main office for registration and checking, while the experimental students included a self adressed stamped envelope with the assignments to their tutors and received their assignments directly back from the tutor. As there is a fixed time limit for students to submit their assignments, and as the tutors are not allowed to return any assignments before the time limit is passed the system itself holds early submitted assignments back for some days.

The experimental students received their assignments back 9 days earlier that the control group on an average (the averages being 24 and 15 days). The range of waiting times was 1.70 days in the experimental group and 1.67 days in the control group. The students in the experimental group were more satisfied with the waiting time.

51 percent of the students who had experience of supplying the tutor with pre-stamped envelope said that it had been worth the inconvenience, while only 36 percent of the control group answered the question positively. On a question whether it was (would be) worth the extra cost, the figures were 65 percentversus 40 percent.

In both the experimental group and the control group a majority wanted to receive their assignments directly back from their tutors. 67 percent of the experimental group preferred to get their assignments directly back, while only 9 percent preferred them to be routed through the main office.

The USAF Extension Course Institute Studies

I have read the three papers by Grover Diehl with great interest. I agree that the paper from 1982 supplies interesting information about research unknown to many distance educators, myself included.

As Diehl says, it has been taken for granted that immediate feedback is instrumental for student learning and that feedback and reinforcement are more or less the same, as information about correct answers and the satisfaction which results, function as reinforcement.

It may be doubtful if feedback from tutors in distance-ducation courses function as reinforcment as proposed in the behavourist and Skinnerian traditions. There has also during the last 10 to 15 years been a shift away from behavourist theory, step by step learning and study techniques based on learning as aquisition of content rather that increased understanding (see for example Marton 1979, Weingartz 1980). So, I welcome Diehls viewpoints and his encouragement to distance educators to review and discuss the theories and experimental results concerning the "delayed retention effect".

To many it might be a surprise that one of the elements often seen as a major drawback in distance education actually may have some "worthwhile educational advantages".

On the other hand, as Diehl himself points out, most of the research on the delayed retention effect has been carried out in the traditional face-to-face setting, where actually "delayed" feedback is quicker than what we normally can achieve in distance education settings which base the two-way communication on postal services. Consequently, how a possible effect of delayed feedback would work in our situation, and what would be the optimal delays for different learning tasks, would be interesting questions to go further into.

Diehl's conclusions for distance education from the literature on the delayed retention effect are clearly interesting, and should result in discussion and possibly re-thinking of some assumptions that we may have taken for granted. Especially, his last point would mean a definite change in advice often given to distance tutors, that they should give feedback to all responses, also the very good ones, which corresponds to good theory in behavioural conditioning.

However, when discussing turn-around time in distance education, feedback interval is only one element, and not necessarily the most significant one. Looking back on Bååth's list above, only point 1 is directly concerned with feedback.

Still, I can well understand that Diehl looks upon questions about feedback interval as an important dimension in understanding possible effects of reducing turn-around time.

If I understand Diehl's papers correctly, the ECI course volumes include in-volume tests including quite small-step easy-earning tasks where immediate feedback should be reccommended, while the end of volume exercises are more complex and demand higher level understanding. So, the procedures followed of giving immediate feedback on in-volume exercises and formal delayed feedback on the end of volume exercises should be well in line with the theory.

It is not completely clear to me whether the ECI courses are to be considered self-instructional material with formal institutional control and feedback through multiple choice tests or actually distance education courses where the tests, scoring and feedback are supposed to function as assignments for submission with clear teaching/learning functions.

In my view, we can expect differences in how students experience turn-around time in relation to whether the assignments are supposed to function as didactic letters in communicating with a tutor (see for example Holmberg 1983), or as end-of-instruction tests where the feedback is of a more formal nature.

Or, using a different terminology, if we look at the distance student working in an inner circle communicating with the material and an outer circle communicating with the tutor, turn-around time might be seen as a much more important variable in systems were great emphasis is put on processes taking place in the outer circle.

As John Bååth points out in his discussion of Holmberg and Schuemer's paper I feel that the importance of quick turn-around time is dependent on tutor behaviour and student-tutor relationships. In courses with a relatively high submission density and emphasis on tutor support in motivation, teaching and socialisation quick response from the tutor is probably much more important than in systems with more impersonal or automatic feedback mechanisms.

The two papers measuring the effect of field scoring on completion time and student performance show that the new procedures had little effect.

In fact, these results are not in disagreement with our findings on effects of reducing turn-around time. We found significant differences in completion rates, number of assignments submitted and student attitudes, but not in study time and grades.

Why did not the new procedures give statistically measurable results? From Diehl's short papers it is not quite clear which functions the end of volume review exercises have. From what I understand, the Career Development Courses at UASF ECI differ in many respects from the distance education/correspondence study courses offered at the institutions I know best. It seems to me that the volumes are quite large. They include in volume self-checking exercises, which might bee seen as substitutes for assignments for submission. The volume review exercises might be considered by the students as examination training. It might also be that the formal scoring is of little importance to the students, dependent on whether the results count toward the final grade and whether the formal feedback is necessary for the student for assessing his/her performance.

The Diehl studies seem to be well designed and controlled. However, the research is not designed as controlled experiments.

The courses include large variations in number of volumes and probably also subject, content and study objectives. Diehl himself points out that the difference in treatment between the groups in the study not only included the change from institute to field scoring and reduction of feedback time, but "Simultaneously, enormous changes were being made in the entire Career Development course (CDC) program including new instructional format and automated course development". This fact may mean that other changes might counteract the effect of field scoring even if this change, if isolated, could have given measurable effect.

I also think that it should be noted that the result variables in the study are restricted to the measurable effects in completion time and student performance. Similar studies often collect student viewpoints and attitudes to the different treatments. In my view student attitudes are clearly relevant in assessing the total quality of the teaching learning system.

Customer service and/or learning effects

Diehl's conclusions are clear:

1. ..."the implementation of field scoring has opened a window for accelerated course completion, of which students have overwhelmingly failed to take advantage."

2. "The elimination of institutional scoring of formative volume review exercises and the implementation of VRE field scoring has made no significant difference in student performance measured by summative end of course examinations."

However, as Diehl points out, as no effect is demonstrated the choice of procedures may depend on other considerations of practical, financial or pedagogical nature. Diehl says:

> "The importance of the findings are, then, dependent on the view of the reader. There may also be public relation aspects of quick turn around which would be of interest to some distance education providers."

To me this last point is of prime importance, and I would like to change the expression somewhat : the public relation aspects must be of focal interest to all distance education providers. (Barache1988).

As distance educators we are working in the service industry, whether we represent private or public institutions, whether we supply training for the open market, for companies and organisations or for our own employes. Concepts, theories and ideas taken from service industry market research and experiences are important to us as are theories and experiences taken from the educational environment. In future we shall be competing with other offers to the student of recreation, education and other services.

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Tutoring frequency in distance education - an empirical study of the impact of various frequencies of assignment submission[2]

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Summary / Abstract

This is a study of the influence of assignment frequency or density (i.e., the distribution of assignments over the course units) and assignment length on the submission frequency, especially the completion rate, and the performance of learners.

An English course was offered to FernUniversität students on a voluntary basis. The participants were divided into groups and received versions of assignments differing from one another in length as well as density.

The hypothesis was that the participants who were required to submit assignments to each course unit would show higher start and completion rates and would obtain better scores in the final tests than participants who were asked to send in the same assignments for submission but clustered after every two or four course units. Three degrees of assignment frequency were thus compared.

The hypothesis was <u>not</u> corroborated by the results: There are no significant differences in the completion or success rates or in performance in the final tests. Furthermore, the results of an evaluation questionnaire demonstrate only slight differences between the groups. Possible reasons for this (non-) results are discussed.

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2 An almost identical version of this paper was published as 'ACSDE Research Monograph No 1' at 'The American Center for the Study of Distance Education, the Pennsylvania State University' in 1989.

TUTORING FREQUENCY IN DISTANCE EDUCATION - AN EMPIRICAL STUDY OF THE IMPACT OF VARIOUS FREQUENCIES OF ASSIGNMENT SUBMISSION

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INTRODUCTION

Questions asked, problems set and tasks given for students to answer, solve and carry out are the most common ways to initiate communication between students and tutors in distance education. They are usually referred to as assignments and require students to submit their solutions to the distance-teaching organisation, university or school.

While it has been shown that quick handling of students' assignments exerts favourable influence on study results in that completion rates correlate with turn-around time (Rekkedal 1983)[1], the equally reasonable assumption that frequent (non-contiguous) tutor-student contacts have similar consequences has not, or in any case only partially, been corroborated.

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1 Some reservations as to the general validity of these findings have been expressed after comparative studies of data from two distance-teaching organisations in Australia and one in each of the following areas: Canada, Pakistan, and the South Pacific:
"The results relevant to the examination of the relationship between turn-around time and persistence ... demonstrate no consistent trend even though the DDIAE [=Darling Downs Institute of Advanced Education] data are consistent with Rekkedal's (1973) conclusion that low turn-around time is likely to increase persistence ...
Of the 82 students who failed to complete requirements, 55 of these experienced high turn-around time, whereas of the 110 students who succeeded in completion requirements only 29 experienced a high turn-around, while 81 students had low turn-around time. This pattern of results could be reasonably interpreted as pointing to the potential efficacy of turn-around time in influencing persistence. In the other four institutional contexts, however, there is no such indication of a significant statistical relationship, although the data for TSIT [=Tasmanian State Institute of Technology] were tending to be compatible with those of DDIAE, with 44 of the 70 students who failed to complete requirements experiencing high turn-around time, which could well have had a deleterious effect on student persistence. In the three other institutional contexts, however, no such patterns emerged; rather, the results could be reasonably interpreted as being indicative of no salient relationship between turn-around and persistence" (Barker, Taylor, White, Gillard, Khan, Kaufman and Mezger 1986, 30)

Previous research

Distance-education practitioners and scholars have asked themselves what frequency exerts the most favourable influence on students' success. This area was first approached in a scholarly way by Ulla Rosberg-Johnsson as early as 1966. She designed a plan for an empirical investigation which, however, was never undertaken (Rosberg 1966). A systematic study of the same problem has been undertaken by Bååth who has made some interesting experiments. He has examined three different groups studying the same course material with a view to finding indications about what could be considered an ideal frequency of assignments ("submission density"). On the basis of the same instructional text one group was required to submit two assignments, a second group four and a third group eight assignments (in one experiment the number of submissions required of the three groups is three, six and 12 respectively, however). The total number of assignment questions was constant and the questions were identical. Bååth illustrates the basic design of these experiments as follows:

	Assignment questions				
	submissions		per submission		total
Group 1	2	x	48	=	96
Group 2	4	x	24	=	96
Group 3	8	x	12	=	96

(Bååth 1979, p.15; cf. Bååth 1980)

Bååth's study comprises achievement variables, study-time variables and attitude variables.

In an early report on his findings he pointed to one "very clear experimental result": more students in the groups with a greater number of submissions "began sending in papers than did the students in the other experimental groups".

> No corresponding consistent differences between the experimental groups were found with regard to course completion. The proportion of completers was about the same in the low, medium, and high submission density groups in most of the experiments. Nor with regard to final test results was it possible to find any significant differences.
>
> (Bååth 1979, 17-18; cf. Bååth 1980).

Significant differences as to attitudes could be established, however. Higher submission density was shown to correlate with "more positive attitudes to the assignments for submission" and to the overall appreciation of the course of study. Students' attitudes to the submission density varied in a way to be expected in that "high-density groups were negative to an increase of the number of submissions, whereas low-density groups favoured such an increase, and medium-density groups were uncertain" (Bååth 1980, 151).
It is disappointing that Bååth's study, which was a painstaking one performed with great acumen, should have resulted in no more clear-cut results than those mentioned. It seems natural and expected that more students should complete and submit assignments to a short first unit than to a long one, which is all that the Bååth study on achievements definitely confirms.

Most educators probably agree that goals close at hand: i.e., goals that can be attained in a reasonably short time, are motivating in that they demonstrate to the student that he or she makes progress. If motivation is taken to promote success this would seem to indicate that a suitably high submission frequency must be expected to lead to greater success than low submission frequency, provided, of course, that the assignments and the units leading to them are felt to represent steps on the path to the desired competence. This was the main hypothesis of the present study.

We further assumed that the difficulty and size of the assignments in the sense of work and time required to carry them out would influence the learning and students' readiness to finish a course. Too comprehensive as well as too short and bitty assignments may discourage students from completing a course.

The basis of the FernUniversität study

Against this background it was felt to be of interest to bring about a kind of replication of Bååth's study. This was done in the years 1987/88 at the FernUniversität Institute for Research into Distance Education (ZIFF).

As in the West German university situation there are legal problems connected with offering students of regular degree programmes alternative versions of a compulsory course; therefore, a special course was developed for the study and offered free of charge to

FernUniversität students interested in taking it as a voluntary additional part of their study. The course (Holmberg 1986) is a fairly elementary one on English language proficiency at a level assumed to be relevant to university students of other subjects than English. Its title is "Essentials of English". It consists of 14 course units (328 pages of the size of the pages of this report), an audiocassette containing 60 minutes of English speech, exercises for self-checking and extensive assignment tasks based on each of the 14 units.

METHOD

Design

Two factors (F1, F2) were to be varied in the study:

F1: The number of items; i.e., the length of the assignments.
Three levels: short assignments (L = 1), assignments of medium length (L = 2) and long assignments (L = 3). The ratios between the levels should be 1 : 2 : 4

F2: Distribution of the items over the course units or "density" in Bååth's terminology.
Three levels: assignments after each course unit (D = 1), after every two course units (D = 2) or after every fourth course units (D = 3).

It seems not to be practicable to cross the factors completely (i.e., to combine each level of factor 1 with each level of factor 2) because then the result would be some assignments with too heavy a workload (e.g., for long assignments - L = 3 - after every two or four course units - D = 2 or D = 3).

Therefore, only six experimental conditions or combinations of the two factors were realized, i.e., the assignments versions A-F :

- Version A: long assignments after each course unit (combination of L = 3 and D = 1)
- Version B: assignments of medium length after each course unit (combination of L = 2 and D = 1)
- Version C: short assignments after each course unit (combination of L = 1 and D = 1)
- Version D: assignments of medium length after every two course units (combination of L = 2 and D = 2); the items of the assignments in version D are identical in content and length with those of version B
- Version E: short assignments after every two course units (combination of L = 1 and D = 2); the items of the assignments in version E are identical in content and length with those of version C
- Version F: short assignments after every four course units (combination of L = 1 and D = 3); the items of the assignments in version F are identical in content and length with those of version C

A group of course participants were assigned at random to each of the experimental conditions or combination of "length" and "density" (versions A-F). This results in the design shown in Box 1:

Box 1: Design

Length (D)	Density: assignments after each CU* D=1	every two CU D=2	every four CU D=3
short (L=1)	G3	G5	G6
medium (L=2)	G2	G4	
long (L=3)	G1		

* CU: course unit(s)

In addition, a control group was to be studied with a view to finding out whether and to what extent the participants make progress by studying the course. This group is not included in the design above. The assignments for this group correspond to those of group 3 (version C) with the difference that this group was required to complete the assignments for the last two course units twice: (a) before the beginning of the course (pretest), and (b) at the end of the course (posttest).

The interaction between the factors "length" (L) and "density" (D) cannot be tested with all groups because of the incomplete crossing of the factors, but it is possible to test this interaction by means of the data of the groups 2 - 5: G3 with D=1/L=1; G5 with D=2/L=1; G2 with D=1/L=2; and G4 with D=2/L=2.

Dependent variables

The following (dependent) variables were studied in relation to "density" and "length" as independent variables:

- Starter rate: percentage of those submitting assignments at the first opportunity for submission (course unit CU 1 for groups 1, 2 and 3; CU 2 for groups 4 and 5; CU 4 for group 6) - related to the number of enrolments in each group.
- Drop-out rate: percentage of those who stopped submitting assignments before finishing the course.
- Completion rate: percentage of those finishing the course (completing the last two assignments)
- Achievement scores for the last two assignments

Some additional variables were to be recorded by means of three questionnaires:

- Attitudes to the course and its material (Evaluation questionnaire)
- Reasons for not submitting any assignment (Non-Starter questionnaire)
- Reasons for refraining from submitting assignments before the end of the course (Drop-Out questionnaire)

Hypotheses:

(1) More frequent contacts between tutor and learner will result in
- a higher submission rate (i.e., a higher start and completion rate and a lower drop-out rate)
- better achievement scores
- a more positive evaluation of the course by the participants.

Thus assignments after each course unit (D = 1) were expected to have more positive effects in the sense described than assignments after every two or every four course units (D = 2 or D = 3).

(2) Assignment tasks of greater length were (up to a certain upper limit) expected to have similar effects as more frequent tutor-learner contacts; i.e.,
- a lower drop-out rate
- a higher completion rate
- better achievement scores
- a more positive evaluation of the course by the participants.

Assignments of greater length (L = 2 or L = 3) were thus assumed to stimulate the learner to study the course material more intensively and to give the learners more opportunities for

(mediated) learner-tutor communication and, therefore, to be more effective than shorter assignments.

But there are restrictions as to the relevance of this hypothesis: The optimal length of assignments obviously depends on the course (e.g., its subject matter, its learning objectives, its content and its complexity) and probably also on the individual learner (e.g., his/her previous knowledge, learning style and his/her time budget for studying). It seems plausible that longer assignments in a language course as used in this study will give more opportunities to exercise and practice than shorter ones, particularly as the subject matter of the course is rather easy to grasp and hardly causes great problems of understanding but rather aims at making students exercise and practice English usage. Too short assignments imply the risk of demanding too little.

It seems not to be unreasonable to expect that the effects of the "density" factor is not the same on all levels of the "length" factor or that the combined effects of both factors on achievement, for instance, are non-additive (non-additivity or interaction of the factors D and L). But the form or shape of this possible interaction may be dependent on the course (its subject matter and difficulty, etc.) similarly as with regard to the effect of the "length" factor. No specific hypothesis regarding the form of this interaction has been developed, but this interaction can be tested by means of the data of groups 2-5 (see above).

Testing the hypotheses - statistical procedures[1]

(a) With regard to frequency of submission

The hypotheses regarding the submission frequencies were tested by means of Chi^2. The frequencies of submissions for the last two course units (or the completion rates) in the experimental groups 1-6 were compared and tested by a "conventional" Chi^2 (and by a parallel test according to the loglinear model).

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1 All analyses were carried out by means of the Statistical Analysis System (SAS - see references)

The starter rates (frequencies of participants submitting assignments at the first opportunity) can be compared directly only between the groups 1-3 (with assignments of varying length after each course unit).

In addition Chi^2 values were computed for the submission frequencies of the groups for each course unit, but these values are interpreted in a purely descriptive way.

(b) Regarding the achievement scores

The differences between the six experimental groups in the achievement scores for the assignments belonging to the last two course units were tested by means of a univariate analysis of variance with the factor "groups" as the independent variable and the achievement scores (sum of raw points over items) as the dependent variable. Only if this overall test of the factor "group" is significant in the expected way is it meaningful to carry out additional "planned comparisons" for the effects of the factors "length" (L) and "density" (D) and their interaction (L*D), on the basis of the data of the groups 2-5.

(c) With regard to course evaluation

The items of the evaluation questionnaire were reduced to composite scores (factor scores) by means of factor analysis. Each of these scores is used as the dependent variable in a univariate analysis of variance to compare the experimental groups.

A significance level of alpha = .01 is used for all statistical tests.

Carrying out the study

(a) Description of the course:

The course used for the study was an English language course "Essentials of English" (Holmberg 1986). The course was not part of a degree programme and the participation was voluntary.

The course comprises 14 course units. Each unit contains about 15 pages of instructional text and between five and 10 pages of vocabulary and commentary; in addition each unit contains one or two self-checking exercises with 2-5 items. The course material includes an audiotape (speakers: the course author and two "native speakers"). The course was announced in an information booklet of the FernUniversität as an English course for adults with some previous knowledge (minimum: about four years of school teaching). The level may be characterised as that of the German "gymnasiale Oberstufe".

A certificate of participation was promised to learners completing the course (i.e., submitting assignments to all course units belonging to their programmes).

The course began in the spring of 1987 and was planned for a maximum running time of a year. Later three additional months for submitting assignments were conceded to the learners. There was no time schedule prescribed for submitting the assignments with the exception of the final date.

The assignments submitted by the learners were corrected and commented on by two teachers of English engaged especially for carrying out the project. The turn-around time for the correction of and commenting on the assignments varied to some degree with the workload of the two tutors; but with few exceptions it was possible to keep a turn-around time of 10 days or less.

(b) Description of the types of items in the different versions

Each assignment version corresponded to one experimental condition and was assigned to one of the experimental groups 1-6. A seventh group functioned as control group (see Group 7).

The groups 1-3 were asked to submit assignments after each course unit, the length of which varied approximately in the ratio of 4 : 2 : 1 in the groups 1, 2 and 3.

Group 1 received version A. The assignments for the course units 1-7 of his version consisted of 8 items each (mostly short sentences to be translated from German into English or vice versa, and lists of words to be arranged by rhyme or for which the phonetic transcriptions were to be given).
The assignments for the course units 8-12 consisted of four translation items each (two from German into English and two vice versa); each item or text to be translated comprised two paragraphs and had a length of about one fourth page.

Group 2 received version B. The assignments for the course units 1-7 of this version consisted of four items each (mostly short sentences to be translated from German into English or vice versa, and lists of words to be arranged by rhyme or for which the phonetic transcriptions were to be given).
The assignments for the course units 8-12 consisted of two translation items each (one from German into English and the other vice versa); each item or text to be translated comprised two paragraphs and had a length of about one fourth page.

Group 3 received version C. The assignments for the course units 1-7 of this version consisted of two items each (mostly short sentences to be translated from German into English or vice versa, and lists of words to be arranged by rhyme or for which the phonetic transcriptions were to be given).
The assignments for the course units 8-12 consisted of two translation items each (two from German into English and two vice versa); each item or text to be translated consisted of a paragraph and had a length of about one eighth page.

The groups 4-6 had to submit assignments with the same items as the groups 2 and 3, repectively, but with different submission density. Group 4 (version D) had the same items as

group 2 (version B) in that the items of two assignments in B were put together to form one assignment in D. Group 5 and 6 (versions E and F) received the same items as group 3 (version C); the items of two (group 5, version E) or of four (group 6, version F) items of version C are combined to form one assignment in E or F.

Group 4 received version D. This version corresponds to version B for group 2 with the difference that the items of two subsequent assignments of B were put together to one assignment in version D. So the first assignment of version D (to be submitted after course unit 2) corresponds with the first two assignments of version B; the second assignment of D (to be submitted after course unit 4) corresponds to assignments 3 and 4 in version B, and so on.

Group 5 received version E. This version corresponds to version C for group 3 with the difference that the items of two subsequent assignments of C were put together to one assignment in version E. So the first assignment of version E (to be submitted after course unit 2) corresponds with the first two assignments in version C; the second assignment of E (to be submitted after course unit 4) corresponds to assignments 3 and 4 of version C, and so on.

Group 6 received version F. This version corresponds to version C for group 3 with the difference that the items of four subsequent assignments of C were put together into one assignment in version F. So the first assignment of version F (to be submitted after course unit 4) corresponds with the first four assignments of version C; the second assignment of F (to be submitted after course unit 8) corresponds to assignments 5 to 8 of version C, and so on.

Group 7, the control group, received the same assignments as group 3 (version C) with the difference that the members of this group had to complete the assignments for the last two course units (13 and 14) twice: (a) before beginning the course (pretest), and (b) at the end of the course (posttest).

The assignments after the last two course units (13 and 14) were identical for all groups. They aimed at repetition with respect to the learning objectives of the course as a whole. Therefore, achievement scores in these assignments can be used as dependent variables in the tests of the achievement hypotheses.

The assignment after course unit 13 consists of two comprehensive translation items, and three grammar exercises (referring to tenses and the wording of questions as well as a task implying answering questions in English).
The assignment after course unit 14 consists of two comprehensive translation items, three grammar (plural forms of nouns, verb forms) and a further translation exercise.
(Further details about the course and the assignments can be found in Holmberg, Schuemer et al. 1988).

(c) Number of enrolments

Student enrolments totalled 1269. Students were assigned to the groups/experimental conditions at random; the number of enrolments per group were:

Group (G1) : 150
Group (G2) : 155
Group (G3) : 150
Group (G4) : 151
Group (G5) : 151
Group (G6) : 149
Group (G7) : 138

The somewhat lower number of enrolments for group 7 (control group) is because it could not be foreseen at the beginning how many students would enrol; therefore, the distribution of the applicants to the groups was at first restricted to the experimental groups 1-6.

(d) Dispatch of the course material

The dispatch of the course material and the assignments was made dependent on the individual student's submission behaviour (i.e., assignment submission was a condition for further course material being sent to students after the initial delivery.)

(e) Questionnaires

As mentioned in section 2.1 the participants were invited to express their views in three questionnaires about:

- the quality of the course and the tutoring (course evaluation)
- the reasons why they did not submit any assignment (questionnaire for non-starters)
- the reasons why they stopped submitting further assignments (drop-out questionnaire).

The evaluation questionnaire includes 43 statements on the quality of the course material, its structure and learning objectives, the assignments, the correction of and the commenting on the assignments, etc.

The non-starter and the drop-out questionnaires consist of several items referring to possible reasons for refraining from submitting assignments and drop-out, respectively.

Most of the items in all three questionnaires mentioned have the form of statements (Likert type) where the Subjects (Ss) were asked to respond to each statement on a 4-point scale of agreement: with 0, not applicable for S; 1, little; 2, largely; 3, completely applicable.

The evaluation questionnaire was sent to the participants together with the material for the second-to-last course unit. The non-starter questionnaire was sent to those students who had applied for enrolment but had not submitted any assignment before the middle of January 1988; the drop-out questionnaire was sent to participants who had submitted assignments only up to course unit 7 two weeks before the final date.

(f) Letters of encouragement

A letter of encouragement was sent to course participants who had not submitted any assignment as late as the end of October 1987.

A similar procedure was applied to those who had at first submitted some assignments but then had not been heard from as late as the end of July 1987.

It should be noted that such an encouraging procedure tends to reduce the effects of the different conditions/ treatments. But it seemed to be meaningful to study the effect of density and length under most realistic conditions: Many distance-teaching institutions use some form of encouragement to reduce non-starter and drop-out rates (in most cases standardised or individualised letters; cf. Schuemer, section 3.5.1 in Graff and Holmberg 1988).

(g) Certificates

The course under study is no part of a degree programme. The participants who had submitted assignments to all course units belonging to their programmes were issued a certificate of participation (without any further qualification).

RESULTS

First the submission frequencies, then the achievement scores (for the assignments of the last two course units) and, finally, the results of three questionnaires will be described.

Submission frequency

Table 1 contains the submission frequencies for each group and for each course unit (CU).

Table 1: Submission frequency for each group and each course unit (CU)

N_A : Number of participants enrolled

	Group: 1	2	3	4	5	6	7
N_A	150	155	150	151	151	149	138
CU							
1	96	111	110	-	-	-	78
2	79	94	104	90	105	-	74
3	67	86	74	-	-	-	53
4	51	73	63	66	81	55	46
5	48	58	56	-	-	-	39
6	42	55	50	60	67	-	34
7	35	51	44	-	-	-	31
8	30	46	40	50	56	38	32
9	24	43	37	-	-	-	29
10	20	39	33	42	46	-	28
11	18	32	32	-	-	-	25
12	16	31	28	34	40	26	25
13	13	27	25	31	34	22	23
14	13	26	20	28	28	21	23

The corresponding submission rates (frequencies related to the number of participants enrolled) for each group (1-6) are summarised in Table 2. (Group 7, which has the only function of testing the learning progress in a before-after comparison, will not be considered in this group comparison.)

Table 2: Submission rates for groups 1-6:

N_A : Number of participants enrolled
% : Percentage related to N_A

		Group: 1	2	3	4	5	6	rate (G1-6) in percent (%)
	N_A	150	155	150	151	151	149	
CU 1	%	64.0	71.6	73.3				
CU 2	%	52.7	60.7	69.3	59.6	69.5	-	
CU 3	%	44.7	55.5	49.3				
CU 4	%	34.0	47.1	42.0	43.7	53.6	36.9	42.9
CU 5	%	32.0	37.4	37.3				
CU 6	%	28.0	35.5	33.3	39.7	44.4	-	
CU 7	%	23.3	32.9	29.3				
CU 8	%	20.0	29.7	26.7	33.1	37.1	25.5	28.7
CU 9	%	16.0	27.7	24.7				
CU10	%	13.3	25.2	22.0	27.8	30.5	-	
CU11	%	12.0	20.7	21.3				
CU12	%	10.7	20.0	18.7	22.5	26.5	17.5	19.3
CU13	%	8.7	17.4	16.7	20.5	22.5	14.8	16.8
CU14	%	8.7	16.8	13.3	18.5	18.5	14.1	15.0

The starter rate[1] for groups 1-3 (G1-G3) is rather high (69.7%); also the starter rates for groups 4 and 5, which had to submit no assignments until they had completed the second course unit (CU), are comparatively high (G4: 59.6% ; G5: 69.5%).

As only groups 1-3 had to submit assignments (of different length) for course unit 1, only their starter rates should be compared directly. Group 1 with the longest assignments (L=3) yields a lower rate than the two other groups with the medium and shortest assignments (G2: L=2; G3: L=1). But the differences between the groups tested by the Chi^2-test are not significant[2]: $Chi^2=3.5$; df=2; $p \leq .17$; contingency coefficient CC=.09.

A comparison of the starter rates in groups G4 and G5, which had to submit their first assignment after finishing course unit 2, with the starter rates for the second assignment in groups 1-3 shows:

- group 1 with the longest assignments (L=3) has the lowest rate (52.7%)
- groups 2 and 4 with assignments of medium length (L=2), but different submission density (G2: assignments for each course unit; D=1 / G4: assignments for every two course units D=2) have rates near 60%
- groups 3 and 5 with the shortest assignments (L=1), but different submission density (G3: assignments for each course unit; D=1 / G5: assignments for every two course units D=2) have the highest rates (near 70%)

These differences are significant: $Chi^2=13.1$; df=4; $p \leq .01$; contingency coefficient CC=.13.

Considering the rates for the assignments belonging to course unit 4 allows a comparison of all the six experimental groups:

- group 5 with short assignments for every two course unit (L=1/D=2) has the highest rate (54%)
- the rates for groups 2 and 4 with assignments of medium length for each course unit (G2: L=2/D=1) or for every two course units (G4: L=2/D=2) are the next highest (47.1% and 43.7%)

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1 All rates are related to the number of participants enrolled.

2 "Conventional" Chi^2-test; an analoguous test by the loglinear model yields similar results. This holds also for the other Chi^2-tests referred to: in no case does the loglinaear test yield results that contradict the conclusions suggested by the conventional Chi^2-test.

- group 3 with short assignments for each course unit (L=1/D=1) yields a rate of 42%
- group 6 with short assignments for every four course units (L=1/D=3) achieves a rate of 37% which is equally low as the rate of group 1 with assignments of the greatest length (L=3) for each course unit (L=3/D=1): 34%

These differences are significant: $Chi^2 = 15.3$; df=5; $p \leq .01$; contingency coefficient CC=.13.

Similar relations between the groups (lowest rate for group 1 and highest for group 5) can be found also for course units 8 and 12 as well as for the assignments of the two final course units 13 and 14 (although there is a tendency towards a lower degree of difference with the later course units).

The submission frequency decreases continuously and drastically from the first to the last assignment in all groups: for example from above 70% for the first assignment in groups 2 and 3 to below 20% for the last assignment or from above 60% to below 10% in group 1.

The submission rates for course units 13 and 14 with identical items for all groups can be interpreted as completion rates. These rates are very low[3] in all groups: only 16.8% for course unit 13 and 15% for course unit 14 (overall rate by summing up the submission frequencies over the six groups and relating this sum to the overall number of enrolments in the six groups).

A comparison of the completion rates for the 6 groups in a purely descriptive way shows the following tendencies:

- Group 1 (with the longest assignments for each course unit; L=3/D=1) yields the lowest rates: 8.7% for course unit 13 and 14.
- Group 5 and 4 (with short or medium assignments for every second course unit; G5: L=1/D=2; G4: L=2/D=2) have the highest rates (G5: 22.5% for course unit 13 and 18.5% for course unit 14 / G4: 20.5% for course unit 13 and 18.5% for course unit 14).

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3 For comparison: In an international survey of 197 institutions a median completion rate of about 67% for the three courses with the highest numbers of enrolment at each institution is reported (for further details see Schuemer, section 3.2.10 in Graff and Holmberg 1988). The above-mentioned overall completion rate of 15% is even lower than the completion rates for other courses of the FernUniversität, which are between 20% and 30% in most cases (cf. Doerfert, Schuemer et al. 1988, 196)

- Group 2 (with assignments of medium length for each course unit; L=2/D=1) yields rates somewhat lower than those of groups 4 and 5: 17.4% for course unit 13 and 16.8% for course unit 14.
- The rates for group 3 (with short assignments for each course unit; L=1/D=1) and for group 6 (with short assignments for every four course units; L=1/D=3) are lower than those for group 2 and higher than those of group 1.

Arranging the groups according to the length of assignments and their density shows:

- If assignments are to be submitted for each course unit (G1 - G3) the completion rate for the group with assignments of medium length (G2) is higher than that of the group with short assignments (G3) and also higher than that of the group with the longest assignments (G1).
- A comparison of the groups which had to submit assignments of identical length and content but with varying density of submission (a: G2 vs. G4 with L=2 and D=1 or D=2 and b: G3 vs. G5 or G6 with L=1 and D=1 or D=2 or D=3) shows: If the assignments have to be submitted after every two course units then the completion rate is higher than if the assignments are to be submitted after each course unit or after every four course units. This tendency is stronger for short assignments (G5 vs. G3 or G6) than for assignments of medium length (G4 vs. G2).

All the differences or tendencies described above are rather weak, however: An overall-Chi^2 test for the submission frequencies in group 1 - 6 is not significant (either for course unit 13 or for course unit 14; see Table 3):

Table 3: Comparison of the submission rates for course units (CU) 13 und 14 in groups 1-6:

N_A : Number of enrolments
"+" : Frequency of submission
"-" : Frequency of non-submission
% : Percentage related to N_A; submission rate
CC : Contingency coefficient

		group: 1	2	3	4	5	6			
	N_A	150	155	150	151	151	149	Chi^2	df	CC
CU13	"+"	13	27	25	31	34	22			
	"-"	137	128	125	120	117	127	12.6	5	.12
	%	8.7	17.4	16.7	20.5	22.5	14.8	p≤.03		
CU14	"+"	13	26	20	28	28	21			
	"-"	137	129	130	123	123	128	8.5	5	.10
	%	8.7	16.8	13.3	18.5	18.5	14.1	p≤.13		

The conclusion is: The main hypothesis - that a higher submission density yields higher completion rates - cannot be confirmed by the results (or: the H_0 of "no differences between the outcomes of the differing experimental conditions" cannot be rejected).

As the overall test for the differences between the six groups is not significant it is not meaningful to carry out further special tests for comparisons with regard to the factors "length" (L) or "density" (D).

Achievement

The assignments for course units 13 and 14 are identical in all experimental groups and refer to the learning objectives of the course as a whole. Therefore, the achievements in these assignments can be interpreted as a final test with regard to these objectives.

The inter-rater consistency of the assessment of the achievement scores should be considered first before the comparision of the achievement scores between the groups.

Nearly all of the assignments for course units 13 and 14 submitted by the learners were assessed independently by the two tutors. The scores for each assignment given by either of the tutors were compared and correlated (Spearman's rho). The correlation coefficients for the overall scores (sum of points over items for the assignment of each course unit: AS13 and AS14) are rho=.94 for AS13 and rho=.96 for AS14. Similarly high coefficients have been found for each of the single items in the assignments: coefficients between rho=.86 and rho=.98. Furthermore, the differences in the median or mean scores between the two raters are very small. Therefore, it can be concluded that the two tutors agree very consistently in their ratings.

In addition it should be tested whether the learners have made some learning progress by studying the course. This can be done by means of the data from the "control group" 7 which completed the assignments for the course units 13 and 14 twice: (a) before the beginning of the course (pretest), and (b) at the end of the course (posttest). 23 of the 103 learners of group 7 who participated in the pretest have also submitted assignments to the course units 13 and 14 at the end of the course. The differences between posttest and pretest scores can be compared by means of a t-test (difference test for correlated observations). These tests yield highly significant posttest-pretest differences: t=6.54 for the assignments of course unit 13 and t=5.36 for course unit 14 (N=23; $p \leq .001$ in either case). Therefore, it can be concluded that the course is efficient to some degree; the learners have made some progress by studying the course.

Only the achievement scores of the six experimental groups 1-6 are considered in the following discussion.

Table 4 contains the mean achievements scores (M) and their standard deviation (s) for each of the groups 1-6, which are arranged according to the levels of the factors "length" (L) and "density" (D). The achievement scores are simply the sum of the points given by the tutors for the items in the assignments for course unit 13 (AS13) and course unit 14 (AS14). (AS13+14 means the sum of the scores for AS13 and AS14).

Table 4: Mean achievement scores (M) and standard deviations (s) per group for the assignments to course unit 13 (AS13) and course unit 14 (AS14) and for the sum (AS13+14)

Density levels: D=1: assignments for each course unit
D=2: assignments for every two course units
D=3: assignments for every four course units

Length (L)		density: D=1	D=2	D=3
AS13				
short (L=1)		G3	G5	G6
	M	56.4	54.6	56.2
	s	8.7	10.0	9.8
		(n=25)	(n=34)	(n=22)
medium (L=2)		G2	G4	
	M	53.4	55.6	
	s	9.6	10.5	
		(n=27)	(n=31)	
long (L=3)		G1		
	M	50.7		
	s	9.9		
		(n=13)		

continued: s. next page

Table 4: continued

AS14

short (L=1)		G3	G5	G6
	M	59.6	60.5	60.0
	s	8.8	9.3	8.0
		(n=20)	(n=28)	(n=21)
medium (L=2)		G2	G4	
	M	58.5	61.4	
	s	8.7	8.2	
		(n=26)	(n=28)	
long (L=3)		G1		
	M	58.5		
	s	9.2		
		(n=13)		

AS13+14 (Sum of AS13 and AS14)

		D=1	D=2	D=3
short (L=1)		G3	G5	G6
	M	116.2	115.5	117.0
	s	16.0	17.9	16.3
		(n=20)	(n=28)	(n=21)
medium (L=2)		G2	G4	
M	M	111.6	117.3	
M	s	17.0	16.2	
		(n=26)	(n=28)	
long (U=3)		G1		
M	M	109.2		
M	s	16.6		
		(n=13)		

The differences between the mean scores are very small (in relation to the great variation of the scores within each of the groups; see Table 4). This is true with regard to the scores for the assignment of course unit 13 (AS13), as well as for the assignment of course unit 14 (AS14), and for their sum (AS13+14). And it is also true if the group comparisons are restricted to those groups which had to submit assignments of identical content for course units 1-12, but in different density: So the mean scores of the groups 3, 5 and 6 (with short assignments (L=1) after each course unit (G3: D=1) or after every two course units (G5: D=2) or after every four course units (G6: D=3)) are close together; similarly, the differences between the groups 2 and 4 (assignments of medium length (L=2) after each (G2: D=1) or after every two course units (G4: D=2)) are small. The differences between all the six groups are too small to be of any practical

or statistical significance. Unifactorial analyses of variance with the factor "groups" as the independent variable (6 levels) and the scores for AS13 or AS14 or for both together (AS13+14) as the dependent variables show that the differences between the groups are not significant[4] (see Table 5).

Table 5: Comparison of the achievement scores of the 6 experimental groups: Analysis of variance (F-Tests).

Variable	F	df	p
AS13	0.85	5; 146	.52
AS14	0.39	5; 130	.85
AS13+14	0.71	5; 130	.62

As these overall tests of the differences between all groups are not significant there is no point in carrying out "planned comparisons" for the tests of the factors "length" (L) or "density" (D) or their interaction (L * D) by rearranging the groups 2-5 (cf. the design in section 2.1).

When summarising the results with regard to the achievement scores we have to state: The hypothesis that a higher submission density has a positive effect on the achievement is not confirmed by the data. It could not be shown that more frequent opportunities for learner-tutor contact (by a higher submission density) result in better achievements.

[4] Homologuous non-parametric Kruskal-Wallis H-Tests yield similar results

Questionnaire results

These results will be summarized here only; for more details see the project report (Holmberg, Schuemer et al. 1988).

Course Evaluation

The evaluation questionnaire contains more than 40 statements of the Likert type. The Subjects (Ss) were asked to indicate the degree of agreement on a 4-point scale) and some bipolar 7-point scales of the semantic-differential type.
This questionnaire was sent to "active" learners who had submitted several assignments and was answered by 175 Ss.

The ratings on the course are on the whole rather positive: Examples of items strongly agreed to by the Ss are:

- Q4: "The material is well structured."
- Q11: "The manner of presentation is ... informative."
- Q20: "The text made a friendly impression."
- Q23: "I felt myself to be challenged by the course to the right degree."
- Q29: "I liked the manner of presentation on the whole."

In the semantic differential scales the course is rated as rather "easy, stimulating, clear, well structured, appealing, easy to grasp, and motivating".

A great majority of the Ss expressed satisfaction with the course material as well as the correction of and commenting on the assignments (Q44.1-44.3).

To simplify the group comparisons and to reduce the great number of variables, a factor analysis of the evaluation items (principal factor solution with subsequent VARIMAX-rotation) was carried out. Three factors were retained and factor scores computed.

These factors are:

Factor I: The items with high loadings on this factor (a_I) have the aspect of "stimulation/dullness" in common. Examples of items with high positive loadings are:

- Q43.2: The bipolar scale "stimulating/boring" ($a_I = .76$)
- Q9: The statement "The course made a rather boring impression on me" (.73)
- Q43.5: The bipolar scale "appealing/repellent (.78)

Examples of items with high negative loadings are:

- Q29: The statement "I liked the manner of presentation" (-.71)
- Q31: The statement "The course stimulated me" (-.75)
- Q43.5: The bipolar scale "demotivating/motivating" (-.72)

Factor II: The items with high loadings on this factor (a_{II}) have the aspect of "difficulty/simplicity" in common. Examples of items with high positive loadings are:

- Q18: The statement "I am certain to have understood the essentials" (.63)
- Q19: The statement "I was able to study the course rather quickly" (.75)

Examples of items with high negative loadings are:

- Q43.1: The bipolar scale "difficult/easy" ($a_I = .74$)
- Q9: The statement "The course reaches the limits of my understanding" (.73)
- Q35: The statement "Studying the course was rather strenuous" (.73)
- Q43.7: The bipolar scale "demanding too little /too much" (-.72)

Factor III: The items with high loadings on this factor (a_{III}) have the aspect of "feelings of being addressed personally by the author or the text"[5] in common. Examples of items with high positive loadings are:

- Q6: The statement "The course units made the impression of a personal letter to me" (.73)
- Q13: The statement "I have the feeling of being addressed personally by the text" (.68)
- Q25: The statement "The manner of presentation made the impression of a personal communication between the author and myself" (.68)

An example of an item with a high negative loading is:

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5 This factor refers to Holmberg's concept of the guided didactic conversation (cf. e.g., Holmberg, Schuemer and Obermeier 1982)

- Q41: The statement "Being addressed personally/the use of personal pronouns (e.g., I and you) is an unimportant feature of style (-.64)

Comparisons of the experimental groups as to course evaluation

Factor scores (standardized: M=0; s=1) were computed and unifactorial analyses of variance were carried out with each of the factor scores respectively as dependent variable and with the "groups" as the independent variable.

The results are summarised in Table 6. As can be seen the differences between the groups are not significant (for alpha=.01) for any of the factor scores; there is only a slight tendency with regard to factor III: group 1 (with the longest assignments after each course unit) have slightly more positive scores than the other groups (that means they tend to have a feeling of being addressed personally to a greater degree than the other groups; see Table 6).

Table 6: Comparisons between the groups with regard to course evaluation (unifactorial analyses of variance).
Independent variable: groups (1-6)
Dependent variables: factor scores (M=0; s=1)
a) factor I : boring (+)/ stimulating (-)
b) factor II : easy (+)/ difficult (-)
c) factor III: feeling of being addressed personally (+)

Group		Factor scores: factor I		factor II		factor III	
	N	M	s	M	s	M	s
1	20	-.07	0.7	-.22	1.2	.36	1.1
2	36	-.07	0.9	-.07	1.1	-.29	0.9
3	32	.39	1.4	-.02	1.0	-.04	1.0
4	32	-.08	0.8	-.03	1.0	.37	1.1
5	36	-.01	1.0	.18	0.9	-.05	1.0
6	19	-.28	1.0	.11	0.7	-.28	0.9
F		1.39		0.51		2.44	
df		5; 169		5; 169		5; 169	
p		.23		.77		.04	

Obviously, the different versions of assignments or experimental conditions have little influence on the overall evaluation of the course by the learners.

As the experimental conditions differ mainly in the assignments for course units 1-12 (i.e., their length and their density) the results for some items referring to the assignments (Q42.1-.7) will be presented here in concluding the description of the evaluation results:

- The statement that "the assignments are too lengthy" (Q42.3) is agreed with to a higher degree by group 1 (with the longest assignments after each course unit) than in the other groups
- That "the assignments occur too seldom" (Q42.5) is more often stated by group 6 (with short assignments after every four course units) than in the other groups
- That "the assignments are too short" (Q42.3) is a statement that reflects the opinion of groups 3 and 5 (with short assignments after each course unit -G3- or after every two course units -G5-) to a higher degree than that of the other groups.

All these tendencies are rather weak, however, and only for Q43.4 ("assignments too short") significant ($Chi^2 = 20.2$; $df = 5$; $p \leq .001$).

Summarising the evaluation results it can be stated:

- The ratings on the course are rather positive on the whole
- The differences between the experimental groups/ conditions with regard to the evaluation are minimal.

Non-Starter Questionnaire

This questionnaire was answered by 107 course participants who had not submitted any assignments.

The questionnaire contains more than 40 statements referring to possible reasons for the non-submittal of assignments. The Subjects (Ss) could respond to each statement on a 4-point scale: 0, not applicable; 1, little ≈; 2, largely ≈; 3, completely applicable.

Reasons for non-submittal mentioned most frequently as (more or less) applicable (scale values 1-3) are for example:

- Q10: "personal circumstances (such as illness, family conditions etc.)"
- Q19: "too little time"

Reasons referring to the quality of the material or that of the assignments are, on the other hand, seldom mentioned.

The differences between the experimental groups as to the reasons for non-submitting are very small. Therefore, they are not presented here in more detail.

Drop-out Questionnaire

This questionnaire was answered by 296 course participants who submitted some assignments at first but ceased submitting later on.

The questionnaire contains more than 30 statements referring to possible reasons for "dropping out". Again the Subjects (Ss) could respond to each statement on a 4-point scale: 0, not applicable; 1, little ≈ ; 2, largely ≈; 3, completely applicable.

The reasons of the "drop outs" for stopping submitting are similar to those of the non-starters. Reasons mentioned most frequently as (more or less) applicable (scale values 1-3) are, for example:

- Q1 : "too little time"
- Q30d: "Studying the course consumed too much time and work"
- Q10 : "personal circumstances (such as illness etc.)"

Reasons referring to the quality of the material or that of the assignments are unfrequently mentioned even by the "drop outs". This pattern of reasons for drop out is also known from other courses of the FernUniversität (cf. Schuemer 1979 for a course on accountancy).

DISCUSSION

The results provide no basis for confidence in statements about the impact of various frequencies of tutor-student contacts. No statistically significant differences between the groups were found with regard to course completion or achievement. There was an unexpected tendency, however, in that the groups submitting an assignment after every two course units tended to produce more assignment solutions and to continue their course work longer than those required to submit an assignment after each course unit, thus contradicting our hypothesis that more frequent tutor-student contacts lead to greater success (lower drop-out rates).

Both the submission frequency and the completion rate are lowest in the group that was given the most extensive assignments and was invited to submit an assignment per course unit. This is remarkable as the course author assumed that this assignment size and communication frequency would be most likely to favour the attainment of the course objectives. There can thus be no doubt that, in Popper's terminology, the main hypothesis on which the study was based has been falsified. Neither in Bååth's investigation nor in the one reported here has high assignment frequency ("density" in Bååth's terminology) been shown to cause higher completion rates or better achievement.

Another ZIFF study analysing data from 197 distance-teaching organisations in various countries points in the same direction. Most of these organisations offer one assignment per course unit. They are <u>not</u> superior as to higher completion rates or lower non-starter rates in comparison with those organisations that offer fewer submission opportunities.[1]

There is no denying that the outcome of these studies is disappointing. While it is no longer possible to hypothesize that higher submission density generally favours completion and good results it still seems reasonable to assume that appropriate assignment frequency, whatever that may be, exerts favourable influence. What is appropriate no doubt varies with subjects, degrees of difficulty, students' prior knowledge, time available for study and other factors. In the present case the course author feels inclined to draw the conclusion that if each

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1 Data bearing on this are reported on in Graff and Holmberg (1988) although the outcome referred to here is not mentioned.

unit is to be followed by an assignment for submission, the course unit should be longer (contain more learning material) than the units of the course used for this study.

With hindsight it is possible to see that the present study was not conducted under ideal conditions. The design of the research and the way it was carried out may even have prompted the reported outcome. Thus, the students who were expected to solve the most extensive assignments (group 1) were given too heavy a workload considering the fact that the course was an additional one beside their normal university study and beside renumerative work, household duties, social commitments, etc. typical of distance students. The very fact that this group was given the most thorough teaching hindered course completion and caused early drop out.

Those students, on the other hand, who were asked to submit the very short assignments after each course unit, seem to have found the tasks too bitty and little rewarding (Group 3), which could have been foreseen.

Submitting assignments after two course units at a time may have given more of an apparent opportunity to repeat and thus secure what had been learned than after only one; the time and work invested in this may have been felt to yield more in relation to the endeavour required and to give enough feedback, particularly as each course unit was fairly short. This assumption cannot be said to be corroborated by the present study although the tendency mentioned above makes it plausible.

There was no extrinsic motivation to complete the course as it was not part of a degree programme or any other type of study leading to recognised competence.

For a possible further replication these difficulties must be avoided and a somewhat exact operationalisation of the concept of appropriate submission density should be brought about.

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Submission Density, Amount of Submission Questions, and Quality of Student-Tutor Dialogue - A Comment on Holmberg & Schuemer

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Submission Density, Amount of Submission Questions, and Quality of Student-Tutor Dialogue --
A Comment on Holmberg & Schuemer

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INTRODUCTION

In the early seventies, when the experimental studies within an EHSC[1] research project were planned, traditional correspondence education was still the dominating form of distance education. In correspondence education, the postal two-way communication between student and tutor was, quite reasonably, considered highly important (cf. Bååth & Wångdahl 1976).

At the same time, however, there was a clear tendency among correspondence teaching institutions to reduce the amount of postal two-way communication in their courses. Above all, what I called the "submission density" was getting lower, i.e. the number of submissions were gradually reduced. In many cases the total amount of submission questions was also substantially diminished. This observation was confirmed by means of an empirical investigation (Bååth 1976). It was therefore no wonder that the question came up how this reduction might affect the students' study perseverance, their learning results, and their attitudes to the studies.

This was, briefly speaking, the background of two of the experimental studies within the EHSC research project:

(1) on the submission density of assignments, and

(2) on assignments for submission being partly replaced by self-checking exercises.

As is obvious from my preliminary paper (Bååth 1979), as well as from my dissertation (Bååth 1980), most of the hypotheses about the effects of varying the submission density had to be rejected. It could only be shown that higher submission density entailed a stronger tendency to start sending in assignments, and that students with low submission density were more in favour of an increase of submissions than students with high submission density. With regard to the second problem, the experiments indicated that it might be possible to replace at least half of the assignment questions by self-checking exercises without any measurable differences in students' study perseverance, achievements or attitudes to the study.

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1) EHSC = European Home Study Council, now merged with another organisation in the Association of European Correspondence Schools (AECS)

THE ZIFF STUDY

It is, however, still quite reasonable to believe that the postal two-way communication is of great importance in distance education of the correspondence education type. It is therefore most satisfying that ZIFF has made a new experimental study on submission density and amount of submission work.

Almost no differences at all between groups are discernable in the results from the ZIFF experiment. This is well in agreement with the outcome of the EHSC experiments. May we conclude that variables like submission density and amount of submission work are of no importance in distance education of this type? Hardly. It may of course be so, but it is also possible that the (non-)results in both settings are due to other facors, which have not been considered or fully controlled in the experimental studies.

In the discussion part of their report, Holmberg & Schuemer call the reader's attention to a number of factors which may have contributed to the lack of significant experimental differences in their own study. In addition, I would like to point out two other possible factors:

(1) the measure of submission density
(2) the work of the tutors.

The Measure of Submission Density

Before varying the submission density of a distance study course, it would appear reasonable to establish its actual, or basic, submission density. How extensive is the amount of work demanded by the whole course in its basic form, divided by the original number of submissions? When we know that, we are able to make hypotheses about what will happen if we vary the number of submissions and, by that, the submission density of the course.

Holmberg and Schuemer state the number of pages of the whole course, from which it is possible to calculate the submission density. Number of pages per submission is a very crude measure, however. It would therefore have been valuable to know also the study time needed. With an empirically established average net study time - in hours - we have probably a much better starting-point for the design of an experimental study on submission density (cf. BÅÅth 1975). For example, if we find out that - as an average - students spend 96 hours on a course which has 8 submissions, we know that the "normal" (or basic, or actual) submission density of this course is 12 hours of study per submission. If so, we are in a good position to judge how the

number of submissions can be systematically varied. We may conclude that in a course of this type, with its specific target group, it is not meaningful to give one of the experiment groups the double number of submissions, because the submission density is already comparatively high. Instead, we may give one experiment group 4 submissions and another 2 submissions - i.e. about 24 and 48 hours of study per submission, respectively.

Without this knowledge about study time we do not know enough, I think, about what the experimental variations actually mean. It is possible that an empirical establishment of the average net study time of the course Essentials of English would have led up to a different decision concerning the variation of the submission density than was actually made in the ZIFF experiment.

The Work of the Tutors

The rationale of the experiments on submission density - both the EHSC and the ZIFF experiments - may be expressed as follows:

> *If the work of the tutors in the postal two-way communication is of great value to the students, then it would seem highly probable that the density of postal contacts between students and tutor(s) is important.*

It would therefore have been of great interest to see what this supposedly valuable work of the tutors was actually like, and how it was organised. First: There were two tutors. How were they assigned to students in the different experiment groups? Second: What was the external turn-round time - i.e. how fast did the students get their assignments back? Further: What did the tutors actually do? What kind of dialogue took place between students and tutor(s)? To what extent were the tutors able to take an active interest in each student and to treat him/her as an individual with specific learning needs and, perhaps, specific learning problems? What did they do in order to encourage the students, to motivate them, to fill them with enthusiasm? And finally: Did they have any other contacts with their students than on the submission occasions, by mail or by telephone?

The only information about the tutors and their work, provided in the ZIFF report, is the following:

> *"The assignments submitted by the learners were corrected and commented on by two teachers of English engaged especially for carrying out the project. The turn-around time for the correction of and commenting on the assignments varied to some degree with the workload of the two tutors; but with few exceptions it was possible to keep a turn-around time of 10 days or less."* [2]
>
> (Holmberg & Schuemer 1988, p. 8; 1989, p. 56)

2) see comment in the introduction to this booklet.

On this point the EHSC study was definitely deficient, too. It is true that my dissertation (Bååth 1980) contains examples of actual students' answers to assignment questions with tutor's corrections and comments, as well as of actual CADE-generated[3] comment letters (pp. 167 - 173). But a systematical analysis of the tutors's work was never undertaken.

It is quite possible that with certain kinds of tutor behaviour - for instance, attempts to treat each student as an individual and to establish a warm, supporting relationship with each student - students will benefit more from a course arrangement with high submission density than with other types of tutor behaviour. With comparatively impersonal tutoring, for instance, it may not matter very much - within certain limits - how seldom the students have to submit their assignments.

THE TUTOR AS A FACILITATOR OF LEARNING IN DISTANCE EDUCATION

The Traditional Postal Two-Way Communication

The importance of teacher/tutor behaviours like "warmth", empathy and enthusiasm has repeatedly been shown in studies of classroom learning (e.g., Gage 1972, and Brophy & Good 1974). There is no reason to believe that distance education differs from face-to-face education in this respect. See for example the case reported by Stein (1960) and the findings related to "learning trauma" in distance education reported by Brady (1976).

Training of distance tutors aimed at stimulating such behaviours - preferably in the form of a distance study course - could do a lot to create a desirable tutor attitude (or, alternatively, to exclude from distance tutoring people who feel that they cannot adopt the appropriate attitude for this work). The Association of European Correspondence Schools offers a training course of this kind (Rekkedal 1987), and a lot of separate distance teaching institutions nowadays run their own training courses for tutors, trying to inspire them to personalize their tuition, to treat their students as individuals, to encourage them, to make them feel that they have a supporting friend in their tutor. A recent training course with this explicit intention is the one issued by Liber Hermods (Bååth 1989).

3) CADE = Computer-assisted distance-education

We must have in mind, however, that the possible impact of the tutor on his/her students' learning, in traditional distance education of the correspondence education type, is rather limited. Normally, the contacts are restricted to the submission occasions, and since the dialogue is traditionally mediated through the post, the communication is most often extremely delayed. A student sends in his/her assignment to the school/university. Not until one, two - or even more - weeks later he/she gets the assignment back, with corrections, a grade, and - hopefully - constructive and encouraging comments. Usually, the dialogue stops here. Then a new dialogue of the same kind starts when the student sends in his/her next assignment (which may very well happen before the previous assignment has come back to the student). In a system like this, it is obviously not too easy to act as a genuine "facilitator of learning" (Rogers 1969).

Nevertheless, the submissions provide an opportunity for contact between student and tutor, for real - not simulated - two-way communication at a distance. It was therefore, in 1973, no doubt relevant to study the possible effects of varying the submission density (and the amount of assignment work), and it still is.

New Media May Provide Substantially Better Opportunities for Facilitators of Learning in Distance Education

In the future, however, such research may become less relevant. New media will make possible other kinds of non-contiguous communication between students and tutor - and between the students themselves. Furthermore, this two-way (and multi-way) communication will take place not only in relation to the submission of assignments, but much more freely throughout a course. Already the telephone is used for such purposes at many distance teaching schools and universities, often as a supplement to the two-way communication by mail. With the spreading of computers and terminals we are getting a new very powerful medium for almost unlimited contiguous two-way and multi-way communication between tutor and students, and between students, by means of electronic mail and computer conferencing (e.g., Poulsen & Rekkedal 1988; Naidu 1989; Mason & Kaye 1989).

In such a network system of contacts with very short delay, the submission density of a course will be of less importance for the contacts between student and tutor. It is also quite probable that a distance tutor with the attitude of a genuine facilitator of learning could be of much better help to his/her students here than in a traditional system where the contacts between tutor and student are almost entirely restricted to the correction of and commenting on assignments distributed by mail.

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